ORDER NO. AD 8902036C2

Service Manual

Compact Disc Player

SL-PJ46A

COMPACT disc DIGITAL AUDIO

DIGITAL

Color

(K)... Black Type

Area

Country Code	Area	Color
(E)	Continental Europe.	(K)
(EB)	Great Britain.	(K)
(EG)	F.R. Germany & Italy.	(K)

SPECIFICATIONS

■ Audio

No. of channels	2 (left and right, stereo)
Frequency response	2–20,000 Hz ± 0.5 dB
Output voltage	2 V (at 0 dB)
Dynamic range	96 dB
S/N ratio	96 dB
Total harmonic distortion	0.005% (1 kHz, 0 dB)
Harmonic distortion	0.003% (1 kHz, 0 dB)
Wow and flutter	Below measurable limit
Output impedance	Approx. 600Ω
Load impedance	More than 10 kΩ
Headphone output level	15 mW, 32Ω

■ Signal Format

Sampling frequency	44.1 kHz
D-A conversion	16-bit linear

■ Pickup

Wavelength	780 nm

■ Infrared remote control transmitter

Dimensions (W x H x D)	60 x 18 x 165 mm
Batteries	UM-4 "AAA" batteries or IEC R03 or equivalent (1.5V x 2)
Weight	100g (including batteries)

■ General

Power supply	
For Great Britain:	AC 50/60 Hz, 240V
For others:	AC 50/60 Hz, 220V
Power consumption	13 W
Dimensions (W x H x D)	360 x 96 x 291 mm
Weight	3.6 kg

Specifications subject to change without notice.
Weight and dimensions shown are approximate.

■ CONTENTS

Page
PLACEMENT 2
CLEANING OF LENS 2
ACCESSORIES 2
PRECAUTION OF LASER DIODE 3
LOCATION OF CONTROLS 4, 5
CONNECTIONS 6
DISASSEMBLY INSTRUCTIONS . . . . 7 ～ 10
MEASUREMENTS AND ADJUSTMENTS 11, 12
TERMINAL FUNCTION OF IC's . . . . 13 ～ 17
BLOCK DIAGRAM 18, 19
INTERNAL CONNECTION OF FL 20

Page
SCHEMATIC DIAGRAM . . . . 21 ～ 29
TERMINAL GUIDE OF IC's, TRANSISTORS AND DIODES . . 30
WIRING CONNECTION DIAGRAM 31
PRINTED CIRCUIT BOARDS . . . . 32 ～ 37
EXPLODED VIEW . . . . 38 ～ 40
REPLACEMENT PARTS LIST . . . . 41 ～ 44
EXPLODED VIEW 45
RESISTORS & CAPACITORS . . . . 45 ～ 48
TECHNICAL INFORMATION . . . . 49 ～ 56
TROUBLESHOOTING GUIDE . . . . 57 ～ 59

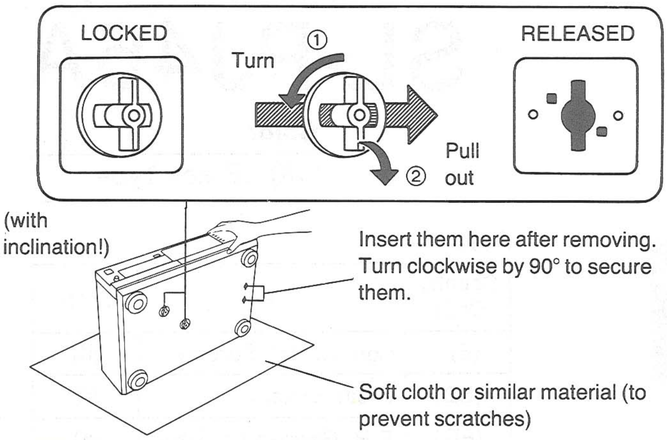
Technics

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

■ PLACEMENT

Before placement

Two transport security devices are secured to prevent the optical pickup from damage during transport.
Be sure to release them before use.



Insert them here after removing. Turn clockwise by 90° to secure them.

Soft cloth or similar material (to prevent scratches)

Note:
When transporting the unit, be sure to remove the compact disc from inside the unit. And replace the transport security devices again following the reverse order not to damage the optical pickup. (Make sure to place the unit with the rear panel facing downward.)

Notes of placement

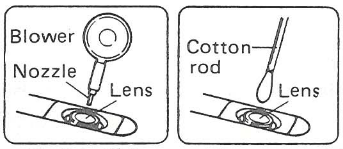
- **■ Place on a flat, level surface so that the front-rear inclination does not exceed 5°.**
- **■ Avoid places such as the following:**
  - ●Near any equipment or device that generates strong magnetism.
  - ●On any heat-generating equipment or device, or in any place where the temperature is high (40°C or higher).
  - ●Extremely cold places (5°C or below).
  - ●Near a tuner or TV (It may cause noise in the broadcast, or disturbance of the TV picture.)
- **■ Do not place heavy objects, other than system components, on top of the unit.**
- **■ When carrying or storing the unit, handle it with care so it is not subjected to any strong bumps.**
  Always remove the disc before storing the unit for any period of time.
- **■ To avoid problems due to vibration.**
  - ●Do not place a book or similar object under this unit.
  - ●Do not route the connection cables (of this or other units) across the operation panel, across the top, or under the unit.

■ CLEANING OF LENS

If the lens is stained causing sound skip or operation failure, open the top cover by pressing the open button, and clean the lens.

● To remove dust or dirt

Blow the lens with the blower provided in the cleaning kit to remove dust or dirt.



Dust or dirt　　Fingerprint

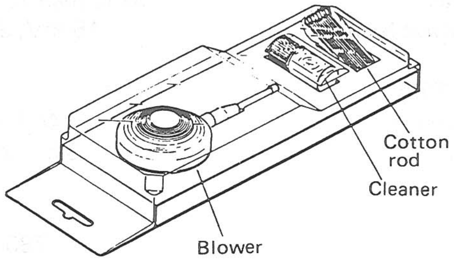
● To remove fingerprint

If the blower is not enough, moisten the cotton rod with the lens cleaner solution and wipe the lens with it from center of the lens to outside.

Cautions:

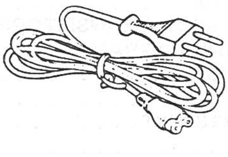
- ● Do not directly apply the cleaner solution to the lens. Do not apply too much solution to the cotton rod or otherwise the solution will flow into the player.
- ● Wipe the lens carefully. Do not give too much stress to the lens or otherwise it may scratch the lens or cause optical pickup trouble.
- ● If the solution should be too much applied, wipe the lens with a dry cotton rod.

Lens cleaning kit (Part No. : SZZP1038C)

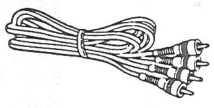


■ ACCESSORIES

●AC power supply cord 1
SFDAC05E03 (E, EG)
SJA188 (EB)

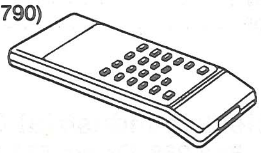


●Stereo connection cable 1
(SJP2249-3)

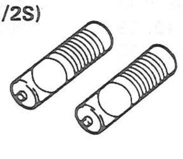


●Optical-fiber cable.............. 1
(SJPD16)

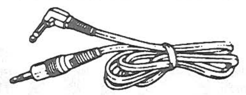
●Remote-control transmitter 1
(EUR64790)



●Batteries 2
(UM-4NE/2S)



●Synchro-recording connection cable 1
(SJP2257T)



■ PRECAUTION OF LASER DIODE

CAUTION: This product utilizes a laser diode with the unit turned "on", invisible laser radiation is emitted from the pick up lens.
Wave length: 780nM
Maximum output radiation power from pick up: 100µW/VDE

Laser radiation from the pick up lens is safety level, but be sure the followings:

1. Do not disassemble the optical pick up unit, since radiation from exposed laser diode is dangerous.
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.
3. Do not look at the focus lens using optical instruments.
4. Recommend not to look at pick up lens for a long time.

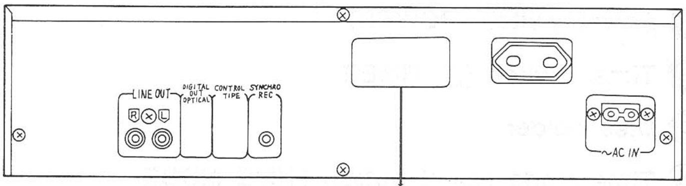
ACHTUNG: Dieses produkt enthält eine laserdiode. Im eingeschalteten zustand wird unsichtbare laserstrahlung von der lasereinheit abgestrahlt.

Wellenlänge: 780nM
Maximale strahlungsleistung der lasereinheit: 100µW/VDE

Die strahlung an der lasereinheit ist ungefährlich, wenn folgende punkte beachtet werden:

1. Die lasereinheit nicht zerlegen, da die strahlung an der freigelegten laserdiode gefährlich ist.
2. Den werksseitig justierten einstellregler der lasereinreit nicht verstellen.
3. Nicht mit optischen instrumenten in die fokussierlinse blicken.
4. Nicht über längere zeit in die fokussierlinse blicken.

ADVARSEL: I dette a apparat anvendes laser.

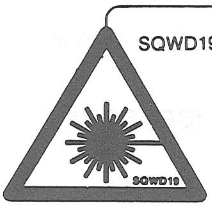


SQWD7

CLASS 1
LASER PRODUCT
SQWD7

Obs:
Apparaten innehåller laser
Komponent av höger laserklass
än klass 1.

SQWD19



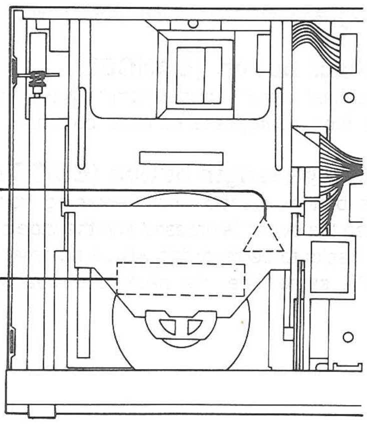
VAROITUS! Laite sisältää laserdiodin, joka lähettää näkymätöntä silmille vaarallista lasersäteilya

SQWD87

ADVARSEL. Usynligt laserlys udstråles ved åbning. UNDGÅ DIREKTE BESTRÅLING.

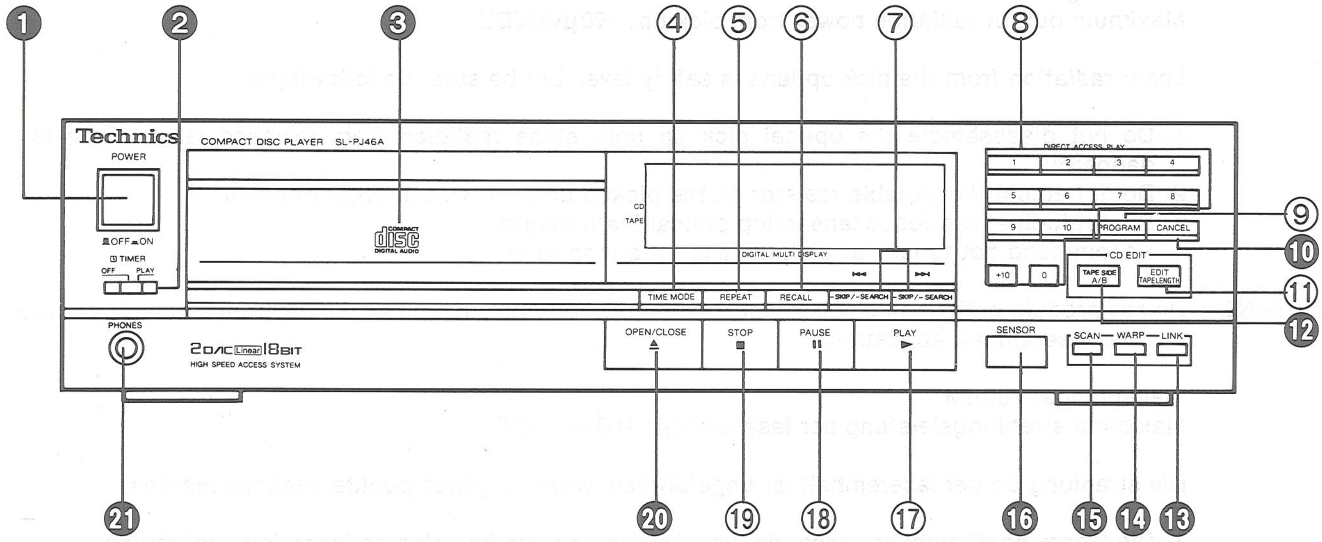
VORSICHT-Unsichtbare Laserstrahlung, wenn Abdeckung geöffnet. Nicht dem Strahl aussetzen.

DANGER-Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
SQWD87



■ LOCATION OF CONTROLS

The functions indicated by the black numbers (with white background, ④ etc.) can be also activated using the remote control transmitter.


❶
❷
❸
④
⑤
⑥
⑦
⑧
⑨
❿
⑪
⓬
⓭
⓮
⓯
⓰
⑰
⑱
⑲
⓴
㉑
Technics
POWER
OFF ON
TIMER
OFF PLAY
COMPACT DISC PLAYER SL-PJ46A
COMPACT disc DIGITAL AUDIO
CD
TAPE
DIGITAL MULTI DISPLAY
DIRECT ACCESS PLAY
1
2
3
4
5
6
7
8
9
10
PROGRAM
CANCEL
CD EDIT
+10
0
TAPE SIDE A/B
EDIT TAPE LENGTH
TIME MODE
REPEAT
RECALL
SKIP/– SEARCH
SKIP/+ SEARCH
PHONES
2DAC Linear 18BIT
HIGH SPEED ACCESS SYSTEM
OPEN/CLOSE
STOP
PAUSE
PLAY
SENSOR
SCAN
WARP
LINK

Control section

❶ **Power switch (POWER)**

❷ **Timer switch (◷ TIMER)**

❸ **Disc holder**

④ **Time mode select button (TIME MODE)**
Use this button to select the desired time display mode.

⑤ **Repeat button (REPEAT)**

⑥ **Recall button (RECALL)**
Press this button to display the program play sequence in the memory.

⑦ **Skip/search buttons (SKIP/SEARCH)**

⑧ **Numeric buttons (+10, 0, 1~10)**
These buttons can be used to select the track numbers and the recording time.

⑨ **Program button (PROGRAM)**

❿ **Cancel button (CANCEL)**
To cancel a track number from memory, first press this button and then appropriate numeric button.

⑪ **Edit tape length button (EDIT/TAPE LENGTH)**
This button is used when recording from a compact disc. When the button is pressed and the tape's length is specified, the tracks to be recorded will be automatically selected and, at the same time, the peak level search will begin.

⓬ **Tape-side select button (TAPE SIDE A/B)**
When recording compact discs to tape, this button can be used to check the number of tracks and amount of tape left over for side A or B.

⓭ **Link button (LINK)**
This button is used when edit-recordings are made from several compact discs.

⓮ **Warp button (WARP)**
This button can be used during edit recording from a compact disc to select tracks of the appropriate length (from among the not-yet-selected tracks) and then to add those tracks to the blank space on the tape, or to replace the tracks with others.

⓯ **Music scan button (SCAN)**
This button can be used to play the first part of each track in order.

⓰ **Remote control signal receptor (SENSOR)**

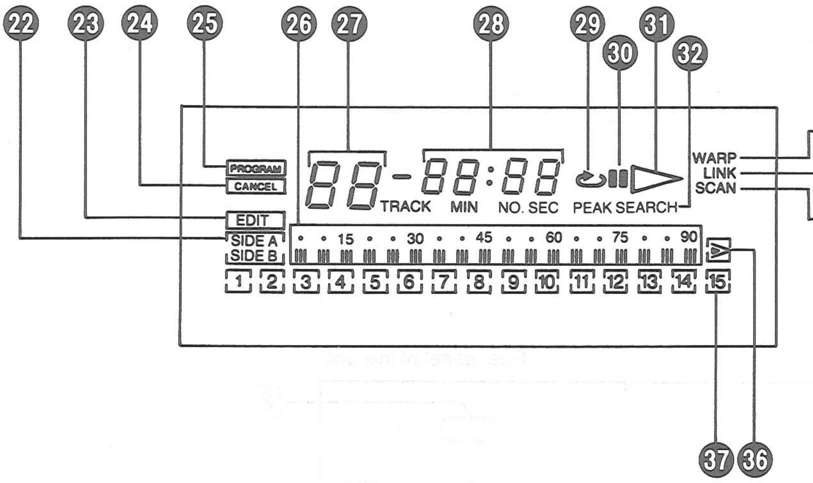
⑰ **Play button (▶ PLAY)**

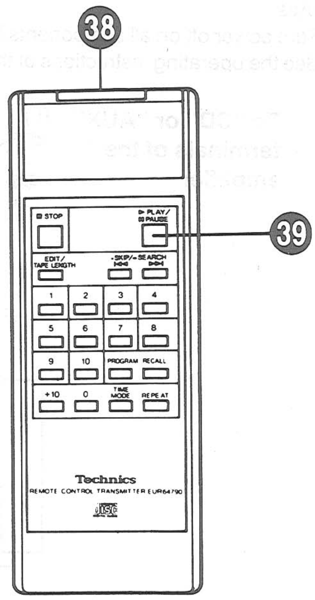
⑱ **Pause button (❚❚ PAUSE)**

⑲ **Stop button (■ STOP)**
This button can be used to stop the disc play, as well as to cancel the various play modes.

⓴ **Disc holder open/close button (⏏ OPEN/CLOSE)**

㉑ **Headphones jack (PHONES)**


㉒
㉓
㉔
㉕
㉖
㉗
㉘
㉙
㉚
㉛
㉜
㉝
㉞
㉟
㊱
㊲
PROGRAM
CANCEL
EDIT
SIDE A
SIDE B
88-88:88
TRACK
MIN
NO. SEC
PEAK SEARCH
WARP
LINK
SCAN
15
30
45
60
75
90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15


㊳
㊴
STOP
PLAY/PAUSE
EDIT/TAPE LENGTH
SKIP/SEARCH
1
2
3
4
5
6
7
8
9
10
PROGRAM
RECALL
+10
0
TIME MODE
REPEAT
Technics
REMOTE CONTROL TRANSMITTER EUR64790

(EUR64790)

Unnumbered buttons on the remote control transmitter function identically to their corresponding parts on the unit.

Indicators section

㉒ Tape side indicator (SIDE A / SIDE B)
Illuminates to show which cassette side, “A” or “B”, has been selected with the tape-side select button.

㉓ Edit indicator (EDIT)
Illuminates when the edit tape length button is pressed and goes out when the stop button is pressed.

㉔ Cancel indicator (CANCEL)
Illuminates while the unit is in the condition that the programmed track can be canceled.

㉕ Program indicator (PROGRAM)

㉖ Time scale
The compact disc's play time or the tape length for an edit-recording is displayed by bars (in units of 5 minutes each).
In addition, the play-position is indicated by continuous bar flashing.

㉗ Track number display (TRACK)

㉘ Time display (MIN/NO./SEC)

㉙ Repeat indicator (↻)

㉚ Pause indicator (❚❚)

㉛ Play indicator (▷)

㉜ Peak-level search indicator (PEAK SEARCH)

㉝ Warp indicator (WARP)

㉞ Link indicator (LINK)

㉟ Scan indicator (SCAN)

㊱ Over mark (▷)
This ▷ indicator illuminates if the total number of tracks on the disc is 16 tracks or more.
When the play reaches the 16th track and thereafter, the bracket indicator “⎵” begins flashing.

㊲ Music matrix (1 ~ 15)
The numbers of the tracks on the disc are displayed up to a maximum of 15.

Remote control transmitter

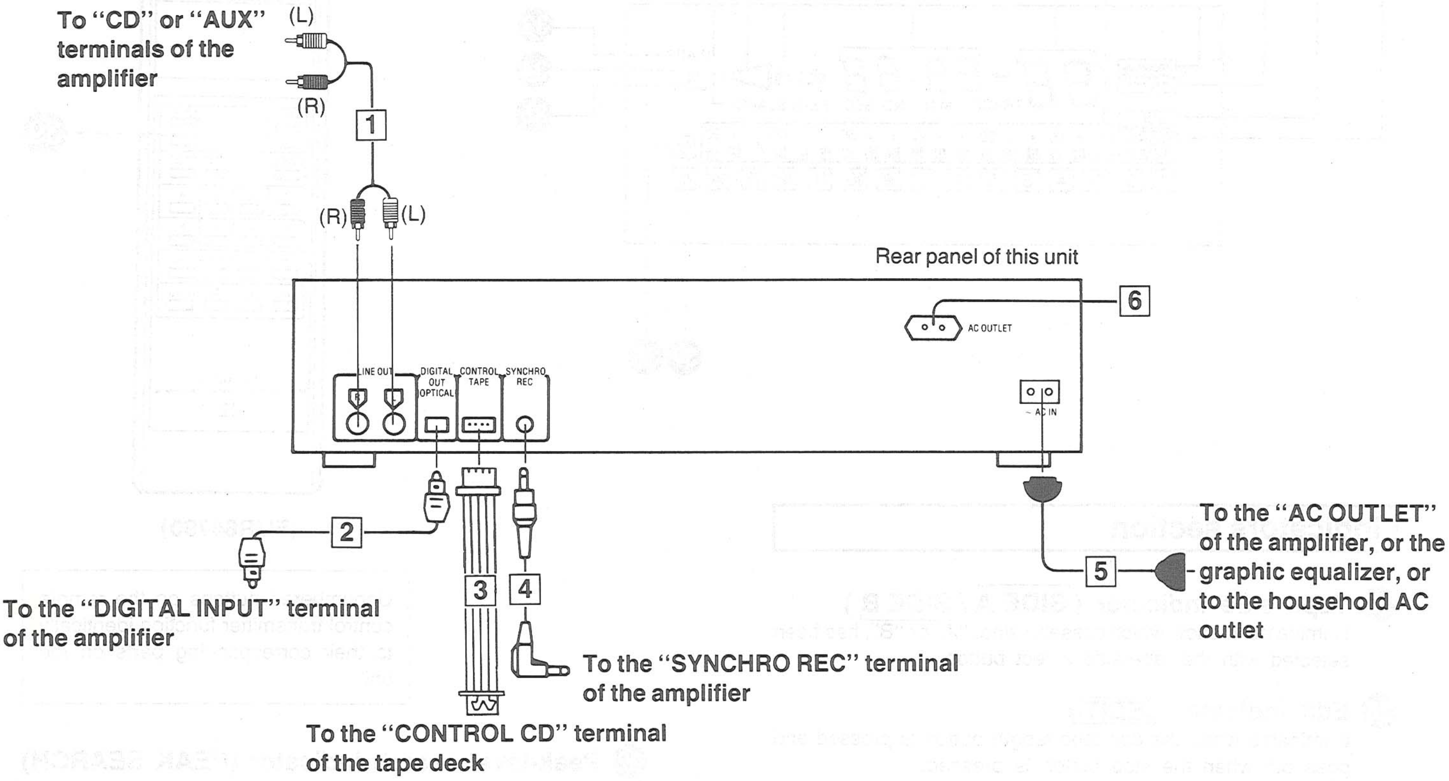
㊳ Remote control signal transmission window

㊴ Play/Pause button (▶ PLAY/❚❚ PAUSE)
Play function works when this button is pressed in the stop or pause mode.
Pause function works when pressed during play.

■ CONNECTIONS

Notes:

- Turn power off on all components before making connections.
- See the operating instructions of the amplifier for details.


To "CD" or "AUX" terminals of the amplifier
(L)
(R)
1
(R)
(L)
Rear panel of this unit
6
AC OUTLET
LINE OUT
DIGITAL OUT OPTICAL
CONTROL TAPE
SYNCHRO REC
~ AC IN
2
To the "DIGITAL INPUT" terminal of the amplifier
3
4
To the "SYNCHRO REC" terminal of the amplifier
To the "CONTROL CD" terminal of the tape deck
5
To the "AC OUTLET" of the amplifier, or the graphic equalizer, or to the household AC outlet

1 Stereo connection cable (included)

Note:
This connection is necessary only when the amplifier to be used has no "DIGITAL INPUT" terminal.

2 Optical-fiber cable (included)

This cable can be used only with an amplifier having the "DIGITAL INPUT" terminal. A dust-protection cap is inserted in the "DIGITAL OUT/OPTICAL" terminal of this unit. Remove this cap only when a connection is to be made to this terminal.

CAUTION

When using the optical-fiber cable, please keep the following points in mind:

1. The maximum length of optical-fiber cable to be used with this unit is 3 m (approx. 10 ft.).
2. Always make sure the plug is fully inserted. If the plug is not inserted all the way, an imperfect connection will result.
3. The optical-fiber cable must never be bent or coiled tightly. Doing so will permanently damage the optical-fiber in the cable and, therefore, prevent proper data transmission. If the cable must be coiled (for storage, etc.), the diameter of the loop should be at least 15 cm (approx. 6 inches).
4. Handle the optical-fiber cable's plug very carefully. Keep the plug free from dust or damage. Dust can be removed by wiping the plug with a soft cloth. Do not use any cleaners or solvents to clean the plug.

3 4-core flat cable (included with tape deck)

This cable can be used only with Technics tape deck having the appropriate "CONTROL CD" terminal.

4 L-type cable (included)

This cable can be used only with a Technics amplifier having the appropriate "SYNCHRO REC" terminal.

5 AC power supply cord (included)

Note:
The configuration of the AC outlet and AC power supply cord differs according to area.

6 AC outlet (UNSWITCHED)

Power is always available, regardless of the unit's power switch setting.
This outlet is exclusively for the connection of other audio equipment, such as a tape deck, etc. Be sure the power consumption does not exceed the wattage specified near the AC outlet.

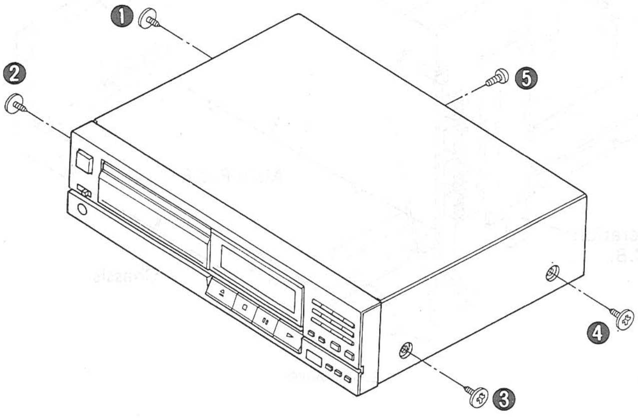
■ DISASSEMBLY INSTRUCTIONS

Warning: This product uses a laser diodes. Refer to caution statements on page 3.

ACHTUNG: • Die lasereinheit nicht zerlegen.
• Die lasereinheit darf nur gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.

* **This CD player is equipped with FPC boards, so handle them with care during disassembly and reassembly.**

Ref. No. 1	Removal of the cabinet
Procedure 1	1. Remove the 5 screws (❶ ~ ❺).



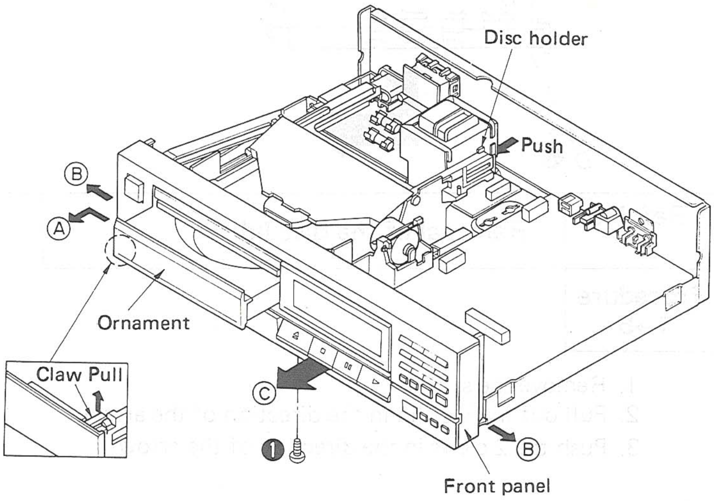
Ref. No. 2	Removal of the ornament of disc holder and the front panel
Procedure 1→2	

A. Ornament of disc holder

1. Push the disc holder slowly in the direction of the arrow.
2. Release the 1 claw and the ornament in the direction of the arrow (Ⓐ).

B. Front panel

1. Remove the 1 screw (❶).
2. Slightly pull out the front panel in the direction of the arrow (Ⓑ).
3. Remove the front panel in the direction of the arrow (Ⓒ).


Disc holder
Push
Ⓑ
Ⓐ
Ornament
Claw Pull
Ⓒ
❶
Ⓑ
Front panel

Ref. No. 3	Removal of the operation P.C.B., headphones P.C.B. and timer switch P.C.B.
Procedure 1→2→3	

A. Operation P.C.B.

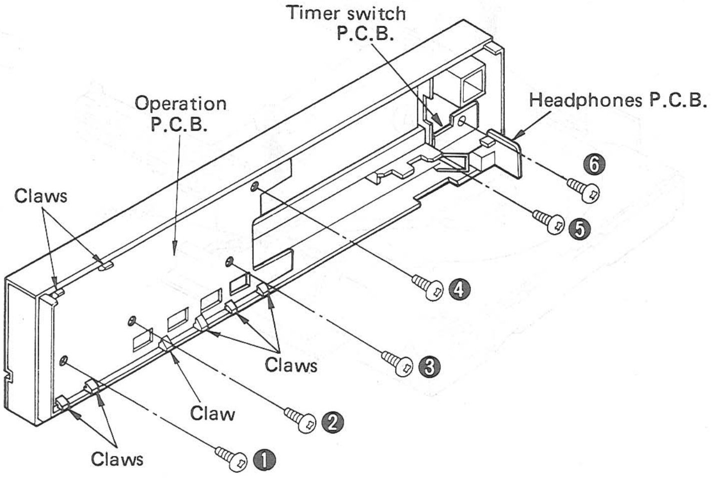
1. Remove the 4 screws (❶ ~ ❹).
2. Release the 8 claws.

B. Headphones P.C.B.

1. Remove the 1 screw (❺).

C. Timer switch P.C.B.

1. Remove the 1 screw (❻).

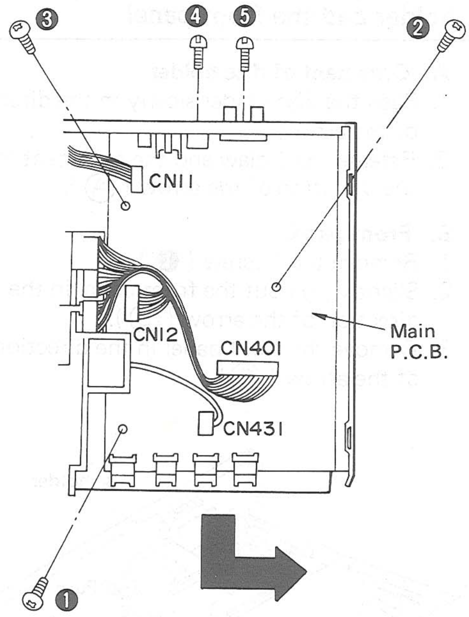

Timer switch P.C.B.
Operation P.C.B.
Headphones P.C.B.
Claws
❻
❺
❹
Claws
❸
Claw
❷
Claws
❶

Ref. No. 4

Removal of the main P.C.B.

Procedure
1→2→3→4

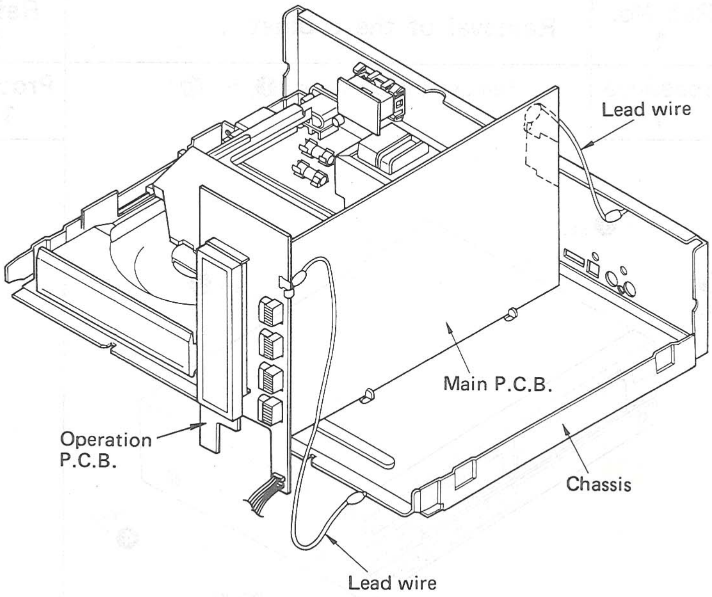
1. Remove the 5 screws (❶ ~ ❺).
2. Remove the 4 connectors (CN11, CN12, CN401, CN431).
3. Lift the main P.C.B. off the retention posts on the chassis.
4. Remove the main P.C.B. in the direction of the arrow.


❸
❹
❺
❷
CN11
CN12
CN401
CN431
Main P.C.B.
❶

How to check the main P.C.B.

When checking the soldered surface of the main P.C.B. and replacing the parts, do as shown below.

1. Connect the main P.C.B. ground terminal (LINE OUT terminal) to the chassis with a lead wire.
2. Connect the operation P.C.B. ground terminal to the chassis with a lead wire.

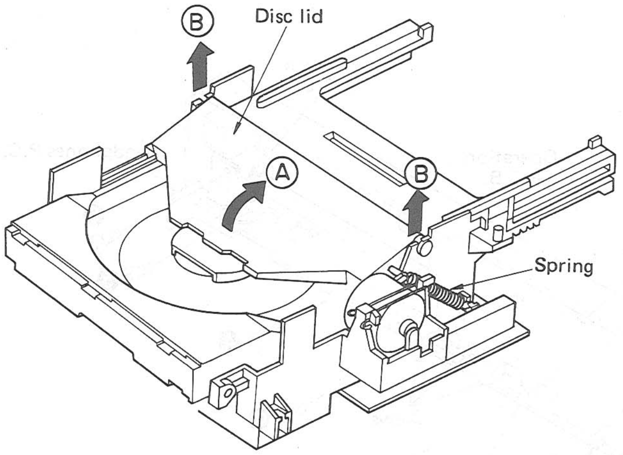

Lead wire
Main P.C.B.
Operation P.C.B.
Chassis
Lead wire

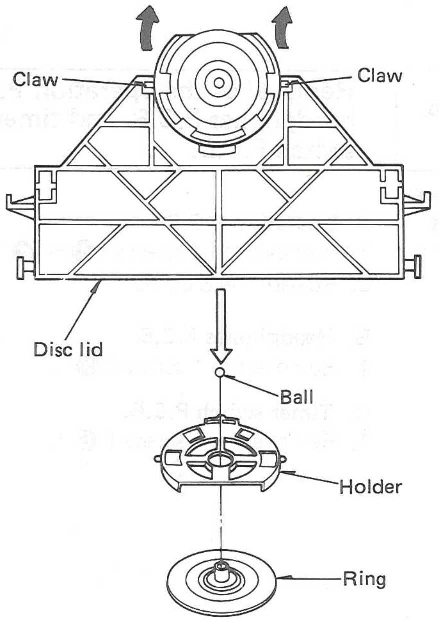
Ref. No. 5

Removal of the disc lid

Procedure
1→5

1. Remove the spring.
2. Pull out the disc lid in the direction of the arrow.
3. Push the 2 claws in the direction of the arrow.


B
Disc lid
A
B
Spring


Claw
Claw
Disc lid
Ball
Holder
Ring

Caution: Be sure to handle the small ball carefully.

Ref. No. 6 — Removal of the disc holder and power switch rod

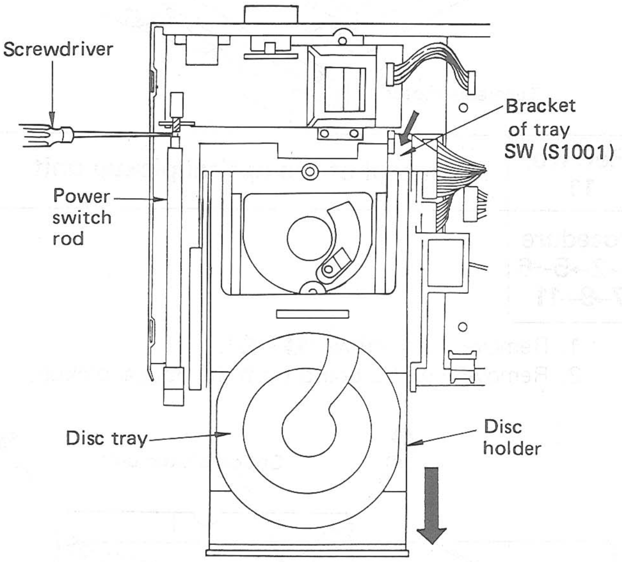
Procedure 1→2→5→6

A. Disc holder

1. Pull the disc holder slowly in the direction of the arrow until the disc tray comes up.
2. Pull the disc holder until it stops.
3. Push the bracket of tray SW (S1001) in the direction of the arrow.
4. Pull out the disc holder further to remove it.

B. Power switch rod

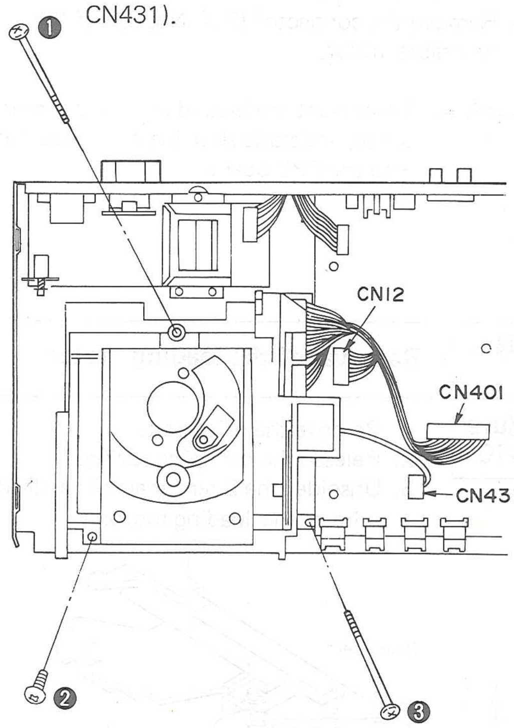
1. Set the power switch in the "OFF" position.
2. Remove the power switch rod by using a screwdriver.


Screwdriver
Bracket of tray SW (S1001)
Power switch rod
Disc tray
Disc holder

Ref. No. 7 — Removal of the loading unit

Procedure 1→2→5 →6→7

1. Remove the 3 screws (❶~❸).
2. Remove the 3 connectors (CN12, CN401, CN431).


❶
CN12
CN401
CN431
❷
❸

Ref. No. 8 — How to check the servo P.C.B.

Procedure 1→7→8

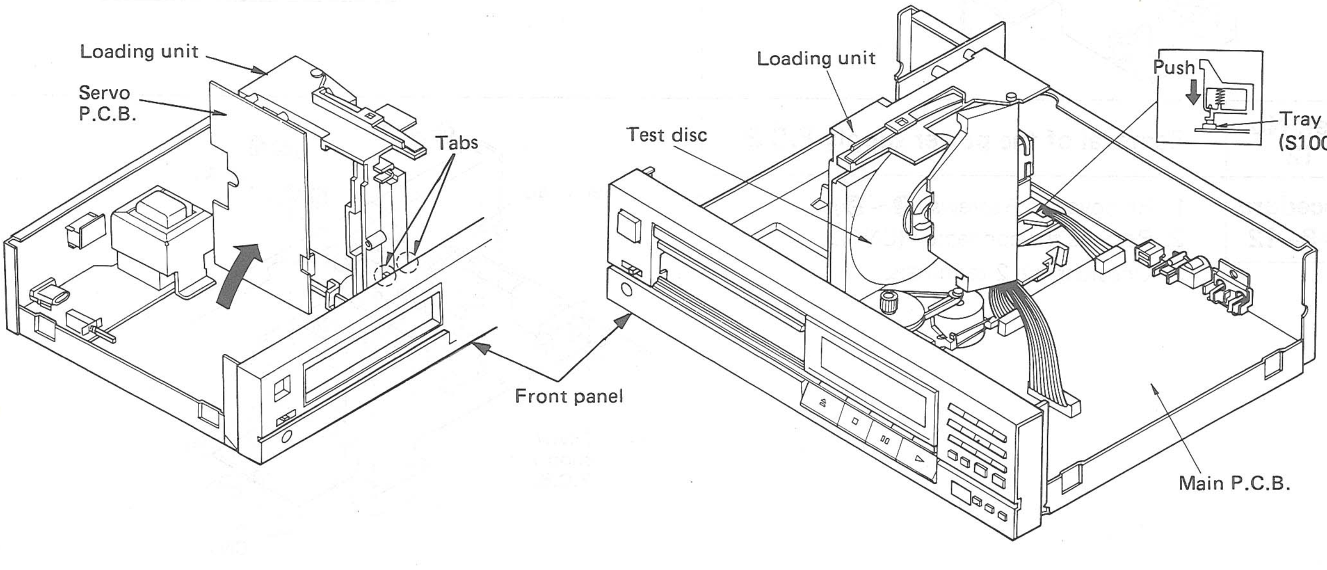
- When checking the soldered surfaces of the servo P.C.B. and replacing the parts, do as shown below.

Note: Insert the loading unit into the tabs of the front panel. (Fixed loading unit)

(To play a disc)

1. Place the test disc.
2. Turn "ON" the power switch of the player.
3. Push the bracket of tray SW (S1001) in the direction of the arrow and release it.

Note: If the test disc fails to rotate, press the tray switch again.


Loading unit
Servo P.C.B.
Tabs
Test disc
Loading unit
Push
Tray SW (S1001)
Front panel
Main P.C.B.

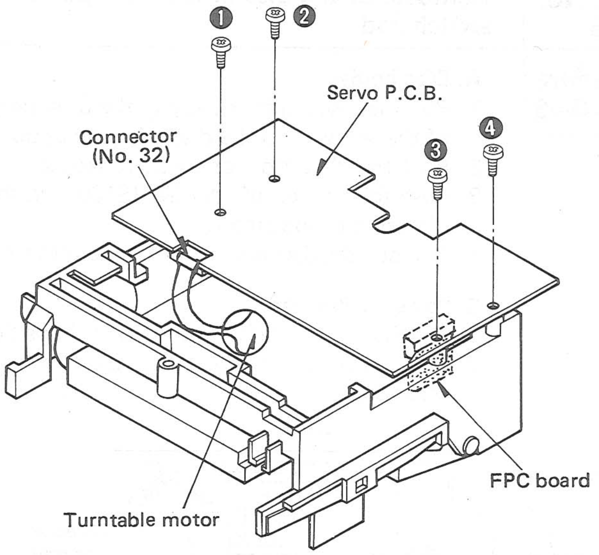
Ref. No.
9

Removal of the servo P.C.B.

Procedure
1→2→5
→6→7→9

1. Remove the 4 screws (❶~❹).
2. Remove the FPC board from the optical pickup.
3. Remove the connector (Ref. No. 32) of the turntable motor.

Caution: To prevent the breakdown of the laser diode, antistatic shorting pin is inserted into the FPC board.

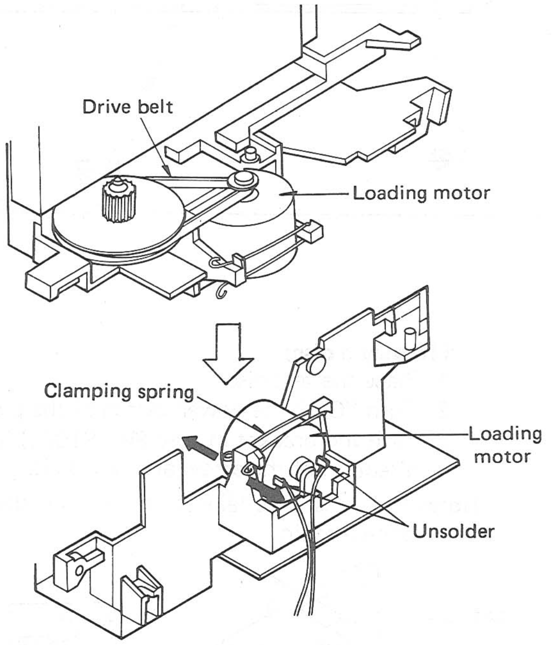

❶
❷
Servo P.C.B.
Connector
(No. 32)
❹
❸
FPC board
Turntable motor

Ref. No.
10

Removal of the loading motor

Procedure
1→6→10

1. Remove the drive belt.
2. Release the clamping spring.
3. Unsolder the 2 terminals of the lead wire of the loading motor.

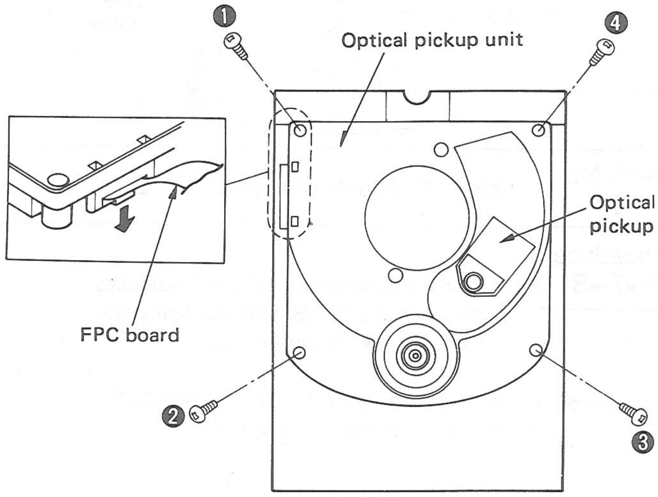

Drive belt
Loading motor
Clamping spring
Loading
motor
Unsolder

Ref. No.
11

Removal of the optical pickup unit

Procedure
1→2→5→6
→7→9→11

1. Remove the 4 screws (❶~❹).
2. Remove the FPC board from the optical pickup.

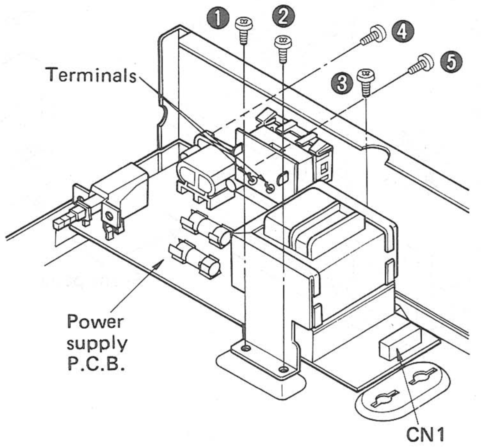

❶
Optical pickup unit
❹
Optical
pickup
FPC board
❷
❸

Ref. No.
12

Removal of the power supply P.C.B.

Procedure
1→6→12

1. Remove the 5 screws (❶~❺).
2. Remove the connector (CN1).
3. Unsolder the 2 terminals.


❶
❷
❹
❺
❸
Terminals
Power
supply
P.C.B.
CN1

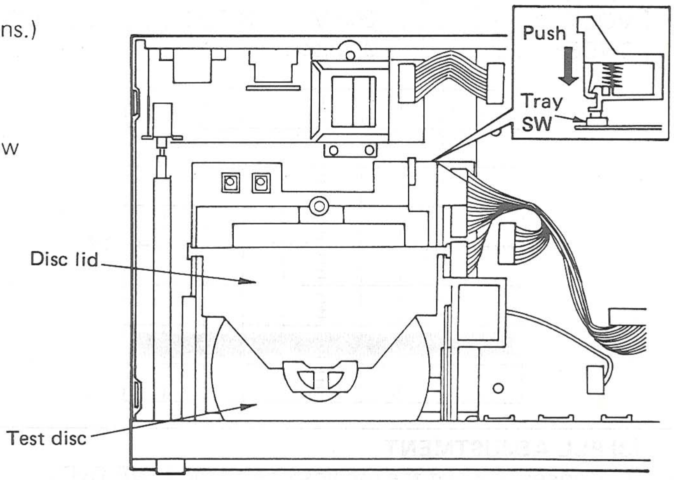
■ MEASUREMENTS AND ADJUSTMENTS

Caution:
It is very dangerous to look at or touch the laser beam. (Laser radiation is invisible.)
With the unit turned "on", laser radiation is emitted from the pickup lens.
Avoid exposure to the laser beam, especially when performing adjustments.

PREPARATION

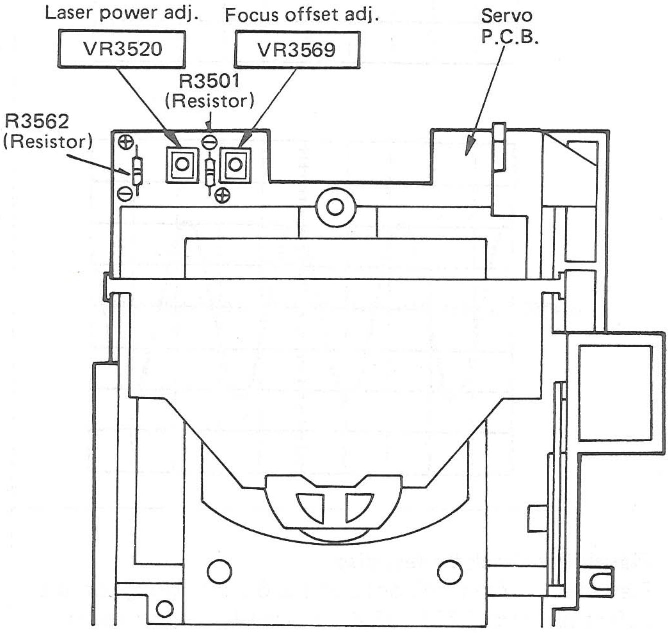
1. Remove the cabinet (see Ref No. 1 of the disassembly instructions.)
2. Remove the disc holder (see Ref No. 6 of the same).
3. Place the test disc on the turntable.
4. Turn "ON" the power switch at the player.
5. Push the bracket of tray SW (S1001) in the direction of the arrow and release it.

Note: If the test disc fails to rotate, press the tray switch again.

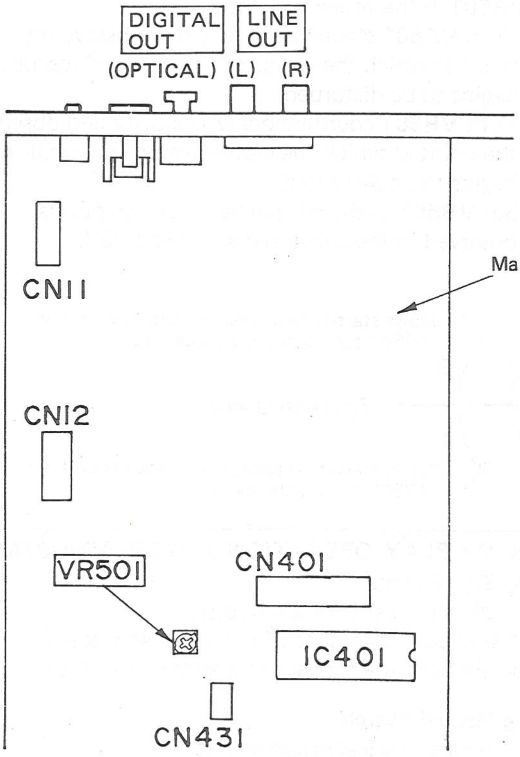

Push
Tray SW
Disc lid
Test disc

ADJUSTMENT POINTS

• Servo P.C.B.


Laser power adj.
VR3520
Focus offset adj.
VR3569
Servo P.C.B.
R3501 (Resistor)
R3562 (Resistor)
⊕
⊖
⊖
⊕

• Main P.C.B.


DIGITAL OUT (OPTICAL)
LINE OUT (L) (R)
CN11
CN12
Main P.C.B.
VR501
CN401
IC401
CN431

Measuring Instruments

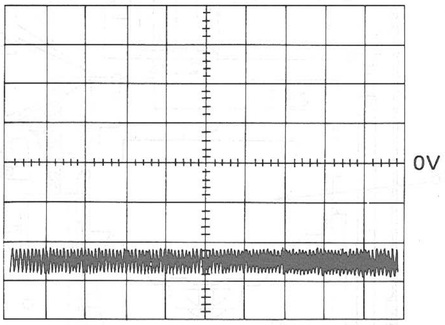
- * Playability test disc (SZZP1054C).
- * Normal disc.
- * Dual-beam oscilloscope with bandwidth of 30MHz or better (with EXT trigger and 1:1 probe).

(1) LASER POWER ADJUSTMENT

1. Connect the oscilloscope's CH1 probe across (+) and (–) of **R3501** (Resistor) on the servo P.C.B.
2. Switch the player power ON, and play track No. 1 on the test disc (SZZP1054C).
3. Adjust **VR3520** so that the voltage is **–50 ± 2mV.**

Oscilloscope setting:

VOLT . . . . 20mV INPUT . . . . DC
SWEEP . . . . 0.2msec.

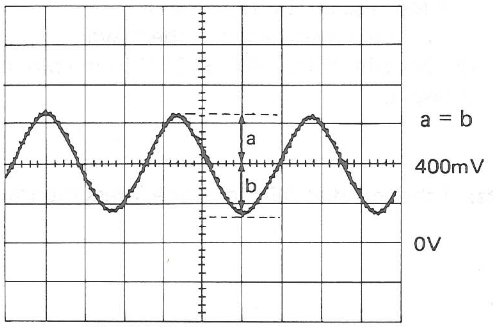


(2) FOCUS OFFSET ADJUSTMENT

1. Connect the oscilloscope's CH1 probe across (+) and (–) of **R3562** (Resistor) on the servo P.C.B.
2. Switch the player power ON, and play track No.1 on the test disc (SZZP1054C).
3. Adjust **VR3569** until the signal amplitude become in the center of **400mV.**

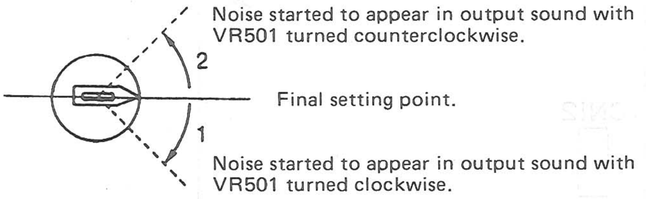
Oscilloscope setting:

VOLT . . . . 200 mV INPUT . . . . DC
SWEEP . . . . 50msec.

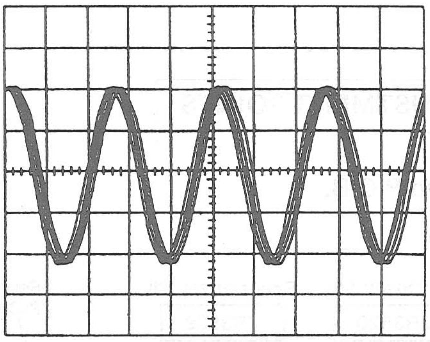


(3) PLL ADJUSTMENT

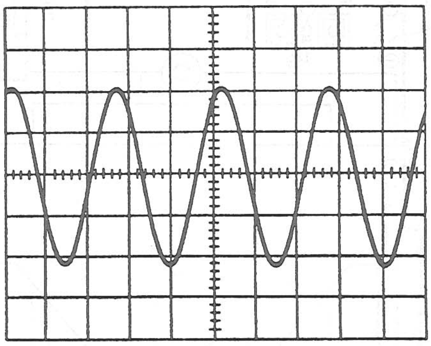
1. Connect CH1 of the oscilloscope to the **LINE OUT terminal** (either of Lch or Rch) and **ground.**
   Oscilloscope setting: VOLT 1V
   SWEEP . . . . . 1msec.
   INPUT . . . . . DC
2. Switch the player power ON, and play track No. 6 (wedge 0.7mm) on the test disc (SZZP1054C).
3. Check the waveform displayed on the oscilloscope and adjust **VR501** in the following steps.
   Step 1. Turn **VR501** clockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.
   Step 2. Turn **VR501** counterclockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.
   Step 3. Set **VR501** in the middle between the points observed in the above steps "1" and "2".


Noise started to appear in output sound with VR501 turned counterclockwise.
2
Final setting point.
1
Noise started to appear in output sound with VR501 turned clockwise.

● NG



● OK



(4) CHECK OF PLAY OPERATION AFTER ADJUSTMENT

* **Checking Skip Search**

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

* **Checking Manual Search**

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

* **Playability check by test disc**

1. Play the 0.7 mm black dot and the 0.7 mm wedge on the defect test disc (SZZP1054C) and verify that no sound skip or noise occurs.

■ TERMINAL FUNCTIONS OF IC's

● IC6501 (TDA8808T): Photo diode signal processor

Pin No.	Mark	I/O Division	Function
1	GCHF	I	Gain control input of HF amplifier. Current output from HF amplitude detector
2	Vp	I	Positive supply voltage
3	HFout	O	HF amplifier and equalizer voltage output
4	DET	I	HF detector voltage input
5	Sc	I	Starting up capacitor input
6	Si/$\overline{RD}$	I/O	On/off control (start input); ready signal output (starting up procedure successful)
7	Beq	I	Equalizer reference current input
8	Bgc	I	DC and LF gain control reference current input
9	FOC START	I	Focus normalizing circuit starting current
10	PLLH	O	PLL on hold output
11	$\overline{TL}$	O	Track loss output
12	$\overline{DODS}$	I	Drop out detector suppression input
13	Vext	I	Negative supply connection for FE and FElag output stage; also substrate connection
14	LPF	O	Low pass filter for Iret, used in track loss ($\overline{TL}$) detector and LF gain control
15	FE	O	Current output of normalized, switched focus error signal
16	FElag	O	Current output of switched focus error signal, intended for lag network
17	LO	O	Laser amplifier current output
18	LM	I	Laser monitor diode input
19	GCLF	I	Gain control input for AC and LF amplifiers. Current output from LF amplitude detector
20	Re2	O	Summation of amplified currents from D3 and D4
21	Re1	O	Summation of amplified currents from D1 and D2
22, 23	D1, D2	I	Current inputs to DC and LF photo diode amplifier
24, 25	D3, D4	I	Current input to DC and LF photo diode amplifier
26	HFin	I	Current input to HF amplifier
27	GND	I	Ground connection of device
28	DEC	I	Decoupling input (internal bypass)

● IC6503 (TDA8809T): Radial error signal processor

Pin No.	Mark	I/O Division	Function
1	Vp	I	Positive supply voltage
2	Cosc1	I	Frequency setting capacitors for oscillator
3	Cosc2		
4	Rwob	I	Wobble generator input
5	Rosc	I	Biassing resistor for oscillator frequency and internal amplitude
6	$\overline{DIV4}$	I	Divide-by-4 input
7	REdig	O	Digital output of sign (Re2 – Re1)
8	B3	I	Input control bits for off-, catch-, plat- status and DAC output current
9	B2		
10	B1		
11	B0		
12	Vext(+)	I	Positive external voltage input
13	Vext(–)	I	Negative external voltage input (also substrate connection)
14	GND	I	GND terminal
15	RADout	O	Current output of amplified (Re2 – Re1) input currents
16	REin	I	Radial error input
17	RElag	O	Voltage output of integrated (Re2 – Re1) input currents
18	Lag	I	Connection of integrator capacitor for (Re1 – Re2) input currents
19	Lead	O	Lead output
20	Vref	I	Internal reference voltage output
21	AGC	I	Gain control input for radial error signal
22	RDAC	O	Biassing resistor for current output for track jumping (3½ bits)
23	offset in	I	Offset control input for radial offset
24	offset off	O	Offset control output for radial offset
25	CLPF	I	Low-pass filter for Re1 and Re2, used for radial offset control
26	CHPF	I	High-pass filter for Re1 and Re2, used for radial offset control
27	Re1	I	Input for amplified currents from photo-diodes D1 and D2
28	Re2	I	Input for amplified currents from photo diodes D3 and D4

• IC301 (MN6625): Digital signal processing

Pin No.	Mark	I/O Division	Function
1	BYTCK	O	Serial data byte clock (Not used, open)
2	FCLK	O	Crystal frame clock (Not used, open)
3	DEMPH	O	De-emphasis ON signal (de-emphasis ON at "H") (Not used, open)
4	SRDATA	O	Serial data output (MSB first)
5	SCK	O	Serial bit clock output
6	LRCK	O	LR discrimination clock (88.2kHz)
7	WDCK	O	Serial data output word clock (Not used, open)
8	LDG	O	L channel deglitch signal (Not used, open)
9	RDG	O	R channel deglitch signal (Not used, open)
10	IPFLAG	O	Interpolation flag (interpolation at "H") (Not used, open)
11	FLAG	O	Error flag terminal (Not used, open)
12	XCK	O	Clock (16.9344 MHz) output (Not used, open)
13	TEST	I	Test mode selection (Not used, connected to +4.9V)
14	TX	O	Digital signal output
15	SLEEP	I	Mode selector ("L":normal, "H":SLEEP mode) (Not used, connected to GND)
16	CSEL	I	Test terminal ("L": normal) (Not used, connected to GND)
17	X1	I	Clock input (16.9344 MHz)
18	X2	O	Clock output (16.9344 MHz) (Not used, open)
19	VSS	I	GND terminal
20	BLKCK	O	Sub-code Q data block clock (75 Hz)
21	$\overline{\text{CLDCK}}$	O	Sub-code frame clock (7.35kHz)
22	$\overline{\text{SUBQ}}$	O	Sub-code Q data
23	$\overline{\text{RST}}$	I	Reset command
24	MLD	I	Load command for mode control data
25	MCLK	I	Data clock for MDATA
26	MDATA	I	Mode control data
27	DMUTE	I	Data mute command
28	$\overline{\text{TRON}}$	I	Tracking servo ON signal (tracking servo ON at "L")
29	STAT	O	Status command for CRC etc. . .
30	SUBC	O	Sub-code serial output data (Not used, open)
31	SBCK	I	Clock for sub-code serial output (Not used, open)
32	SMCK	O	System clock (4.2336MHz)
33	VDD	I	Power supply (connected to +4.9V)
34	MEMP	I	Deemphasis command
35	FG	I	Turntable motor FG signal input (Not used, open)
36	PC	O	Turntable motor ON command (ON at "L")
37	EC	O	Turntable motor drive signal
38	RESY	O	Resynchronizing signal (Not used, open)
39	DO	I	Drop-out detection signal (Drop-out at "H")
40	SRF	I	Sliced RF signal
41	EFM	I	Modulation data
42	PCK	I	PLL extract clock (4.2336MHz)
43	FPC	O	PLL frequency comparision signal
44 ∫ 51	D7 ∫ D0	I/O	16K RAM data input/output
52	RAM OE	O	Read out enable
53	RAM WE	O	Write enable
54 ∫ 64	RAM A0 ∫ RAM A10	O	16K RAM address signal (RAMA0: LSB, RAMA10: MSB)

● IC401 (MN1554PJE-2): System control

Pin No.	Mark	I/O Division	Function
1	VSS	I	GND terminal
2	DMUTE	O	Data mute command
3	MDATA	O	Mode control data
4	MCLK	O	Data clock for MDATA
5	MLD	O	Load command for mode control data
6	NC	–	Not connected
7	NC	–	Not connected
8	INH	O	Track loss det. signal output
9	MUTE	O	Muting signal output
10	EMPH	O	Deemphasis command
11	NC	–	Not connected
12	SIRQ	I	Track loss det. signal input
13	BLKCK	I	Sub-code Q data block clock (75 Hz)
14	$\overline{\text{CLDCK}}$	I	Sub-code Q data frame clock (7.35 KHz)
15	NC	–	Not connected
16	SUBQ	I	Sub-code Q data
17	RESET	I	Reset command
18	TL	I	Track loss signal
19	RE DIG	I	Radial error digital
20	HFD	I	HF detector output for PLLH
21	TRAY SW	I	Disc holder open/close det. signal input
22	DIV4	O	Radial error digital divided by four
23	DODS	O	Drop out detector suppression
24	MODEA	–	Not used, open
25	FR/REV	–	Not used, open
26	B0	O	Control bits for radial circuit
27	B1		
28	B2		
29	B3		
30	CLOSE	O	Disc tray "close" detection
31	OPEN	O	Disc tray "open" detection
32	TR ON	O	Tracking servo ON command
33	VDD	I	Power supply (connected to +4.9V)
34	NC	–	Not connected
35	NC	–	Not connected
36	P53	–	Not used, open
37	P60	I	Period det. select signal input
38	POL	I	Period det. select signal input
39	SKATE	I	Period det. select signal input
40	STAT	I	Status command for CRC etc. . . .
41	SP0	I	Speed control code input
42	SP1		
43	SP2		
44	SP3		
45	RECV	I	Data receipt command signal
46	SEND	I	Data transmission command signal
47	ACK	I	Data discrimination signal
48	CLK	I	Data clock signal
49	DATA0	I	Key scan signal
50	DATA1		
51	DATA2		
52	DATA3		
53	CMD0	O	Command signal of access mode
54	CMD1		
55	CMD2		
56	CMD3		
57	NC	–	Not connected
58	NC	–	Not connected
59	NC	–	Not connected
60	SI/RD	I/O	On/off control for laser supply and focus circuit
61	OSC2	I	Clock input
62	OSC1	I	Clock input (4.2336 MHz)
63	XI	I	Digital input of signal
64	X0	–	Not used, open

• IC403 (MN1551 PJF-1): Period det. & speed control

Pin No.	Mark	I/O Division	Function
1	VDD	I	Power supply (connected to +4.9V)
2	NC	—	Not connected
3	NC	—	Not connected
4	TL	I	Track loss signal
5	REDIG	I	Radial error digital
6	DIV4	I	Radial error digital divided by four
7	SP3	O	Speed control code output
8	SP2		
9	SP1		
10	SP0		
11	SKATE	O	Period det. select signal output
12	POLAR	O	Period det. select signal output
13	DIVC	O	Period det. select signal output
14	SIRQ	O	Track loss det. signal output
15	COMO0	I	Command signal of access mode
16	COMO1		
17	COMO2		
18	COMO3		
19	NC	—	Not connected
20	NC	—	Not connected
21	NC	—	Not connected
22	NC	—	Not connected
23	NC	—	Not connected
24	SYNC	—	Not used, open
25	RESET	I	Reset command
26	OSC2	—	Not used, open
27	OSC1	I	192 fs (8.4672 MHz) clock input
28	VSS	I	GND terminal

• IC601 (MN15283PEM–2): System control and FL drive

Pin No.	Mark	I/O Division	Function
1	VSS	I	GND terminal
2	X0	O	Not used, open
3	X1	I	Optical servo condition input (Not used, open)
4	PO0 (RECV)	O	Data receipt command signal
5	PO1 (SEND)	O	Data transmission command signal
6	PO2 (ACK)	O	Data discrimination signal
7	PO3 (CLK)	O	Data lock signal
8 ~ 11	P10 (D0) ~ P13 (D3)	O	Key scan signal
12	$\overline{\text{SYNC}}$	O	Not used, open
13	$\overline{\text{RST}}$	I	Reset signal input (reset at "L")
14	$\overline{\text{IRQ/TC1}}$	I	Sub-code block (Q data) clock (75 Hz) input (Not used, open)
15 • 16	P50 • P51	I	Key return signal
17	P52	I	Timer play control signal
18	P53 (EST)	I	End detection signal of CD editing recording.
19	$\overline{\text{SBT}}$	I	Sub-code frame clock (7.35 kHz) (Not used, open)
20	$\overline{\text{SBD}}$	I	Sub-code Q data input (Not used, open)
21	P20 (CEM)	O	CD recording signal
22	P21 (PLE)	O	CD play signal
23 • 24	P22 • P23	O	Synchro rec control signal
25 ~ 28	P30 ~ P33	—	Not used, open
29 ~ 32	P40 ~ P43	I	Key return signal
33	P60	—	Not used, open
34 • 35	P61 • DAC	—	Not used, open
36	VPP	I	FL drive power supply (connected to –27.8V)
37 ~ 52	D0 ~ D9 • DA ~ DF	O	FL grid signal
53 ~ 61	S0 ~ S8	O	FL anode signal
62	VDD	I	Power supply (connected to +4.9V)
63	OSC2	I	Clock terminal
64	OSC1	I	Clock input

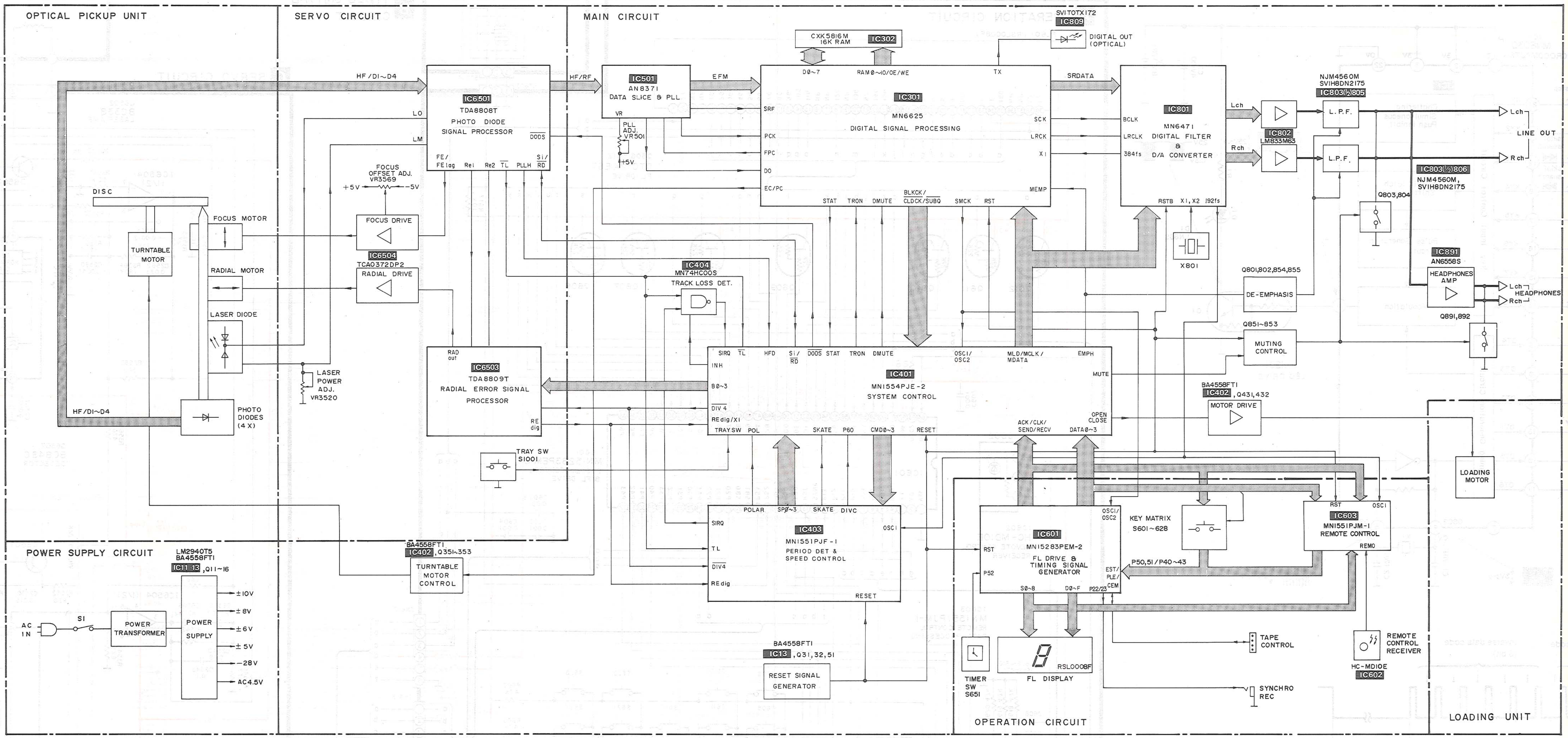
• IC501 (AN8371S): Data slice and PLL

Pin No.	Mark	I/O Division	Function
1	VEE	I	Power supply (connected to –5.2V)
2	SRF	O	Sliced RF signal
3	EFM	O	Modulation data
4	D.GND	I	GND terminal (digital system)
5	PCK	O	PLL extract clock (4.2336MHz)
6	VCC	I	Power supply (connected to +4.9V)
7	VA	I	VCO free run frequency adjusting current input (Not used, open)
8, 9	VC1, 2	I	Capacitor connection for VCO oscillator frequency
10	VR	I	Resistor connection for VCO oscillator frequency
11	PD	I	Capacitor connection for PLL DO protection
12	PL1	I	PLL loop filter connection
13	PL2	I	PLL loop filter connection
14	FPC	I	PLL frequency comparison signal
15	RF	I	Data
16	ARF	O	RF signal output with AGC output
17	AGC	I	ARF signal input for AGF drop-out detection input
18	AC	I	Loop filter for AGC connected
19	DO	O	Drop-out detection signal
20	A.GND	I	GND terminal (analog system)
21	DSL	I	RF signal input for data slicing
22	SLC	I	Slicing level control signal input (Not used, connected to GND)
23	FC1	I	Filter capacitor for data slicer connected
24	FC2	I	Filter capacitor for data slicer connected

•IC801 (MN6471): Digital filter and D/A converter

Pin No.	Mark	I/O Division	Function
1	MLD	I	Command load input (load: L)
2	RSTB	I	Reset command
3	IE	I	Not used, connected to GND
4	TP1	—	TEST terminal
5	TP2	—	
6	TEST1	I	TEST terminal 1 (connected to GND)
7	TEST2	I	TEST terminal 2 (connected to GND)
8	NC	—	Not connected
9	NC	—	Not connected
10	AVDD4	I	Power supply (connected to +4.7V)
11	OUTL (–)	O	Lch data output, (–) terminal
12	AVSS4	I	GND terminal
13	AVSS3	I	GND terminal
14	OUTL (+)	O	Lch data output, (+) terminal
15	AVDD3	I	Power supply (connected to +4.7V)
16	NC	—	Not connected
17	AVDD2	I	Power supply (connected to +4.7V)
18	OUTR (+)	O	Rch data output, (+) terminal
19	AVSS2	I	GND terminal (analog system)
20	AVSS1	I	GND terminal (analog system)
21	OUTR (–)	O	Rch data output, (–) terminal
22	AVDD1	I	Power supply (connected to +4.7V)
23	DVDD1	I	Power supply (connected to +4.5V)
24	DVSS1	I	GND terminal (digital system)
25	X2	O	Clock output
26	X1	I	Clock input
27	NC	—	Connected to GND
28	DVDD2	I	Power supply (connected to +4.5V)
29	DVSS2	I	GND terminal (digital system)
30	NSUB	I	Sub-strate terminal (Not used, connected to +4.5V)
31	ZFLGB	O	Zero input detector terminal (Not used, open)
32	192fs	O	192 fs (8.4672MHz)
33	LRPOL	I	LR clock selector (Not used, connected to +4.5V)
34	LRCLK	I	LR discrimination signal input
35	BCLK	I	Serial bit clock input
36	SRDATA	I	Serial data input (MSB first)
37	DVSS 3	I	GND terminal (digital system)
38	DVDD	I	Power supply (connected to +4.5V)
39	384 fs	O	384 fs (16.9344MHz) output
40	PD	I	Power down terminal (Not used, connected to GND)
41	MDATA	I	Mode control data
42	MCLK	I	Data clock for MDATA

■ BLOCK DIAGRAM



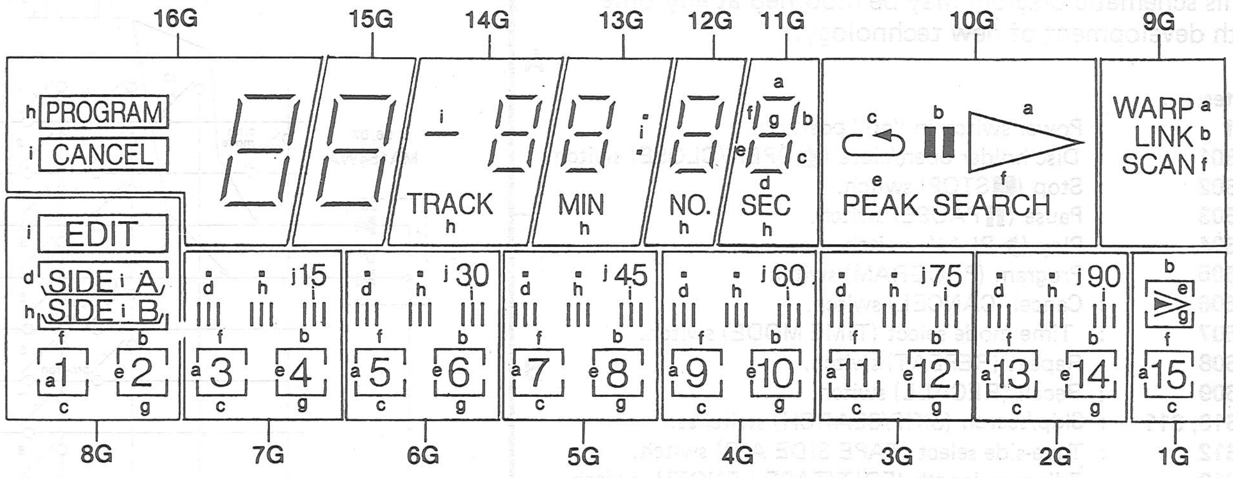
OPTICAL PICKUP UNIT
SERVO CIRCUIT
MAIN CIRCUIT
POWER SUPPLY CIRCUIT
OPERATION CIRCUIT
LOADING UNIT
DISC
FOCUS MOTOR
TURNTABLE MOTOR
RADIAL MOTOR
LASER DIODE
LASER POWER ADJ. VR3520
PHOTO DIODES (4 X)
HF/DI~D4
IC6501 TDA8808T PHOTO DIODE SIGNAL PROCESSOR
LO
LM
DODS
FE/FE lag
Re1
Re2
TL
PLLH
Si/RD
FOCUS OFFSET ADJ. VR3569
+5V
-5V
FOCUS DRIVE
IC6504 TCA0372DP2
RADIAL DRIVE
IC6503 TDA8809T RADIAL ERROR SIGNAL PROCESSOR
RAD out
RE dig
TRAY SW S1001
HF/RF
IC501 AN8371 DATA SLICE & PLL
VR
PLL ADJ. VR501
+5V
EFM
CXK5816M 16K RAM
IC302
D0~7
RAM0~10/OE/WE
TX
SVITOTX172
IC809
DIGITAL OUT (OPTICAL)
IC301 MN6625 DIGITAL SIGNAL PROCESSING
SRF
PCK
FPC
DO
EC/PC
STAT
TRON
DMUTE
BLKCK/CLDCK/SUBQ
SMCK
RST
MEMP
SCK
LRCK
XI
SRDATA
IC801 MN6471 DIGITAL FILTER & D/A CONVERTER
BCLK
LRCLK
384fs
RSTB
X1, X2
192fs
X801
Lch
Rch
IC802 LM833M63
NJM4560M SVI18DN2175
IC803(1/2)805
L.P.F.
L.P.F.
IC803(1/2)806 NJM4560M, SVI18DN2175
LINE OUT
Lch
Rch
Q803,804
IC891 AN6558S HEADPHONES AMP
Lch
Rch
HEADPHONES
Q891,892
Q801,802,854,855
DE-EMPHASIS
Q851~853
MUTING CONTROL
IC404 MN74HC00S TRACK LOSS DET.
IC401 MN1554PJE-2 SYSTEM CONTROL
SIRQ
TL
HFD
Si/RD
DODS
STAT
TRON
DMUTE
OSC1/OSC2
MLD/MCLK/MDATA
EMPH
INH
B0~3
DIV4
REdig/XI
TRAYSW
POL
SKATE
P60
CMD0~3
RESET
MUTE
ACK/CLK/SEND/RECV
OPEN CLOSE
DATA0~3
BA4558FTI
IC402, Q431,432
MOTOR DRIVE
LOADING MOTOR
IC403 MN1551PJF-1 PERIOD DET & SPEED CONTROL
POLAR
SPØ~3
SKATE
DIVC
SIRQ
TL
DIV4
REdig
OSC1
RESET
BA4558FTI
IC402, Q351~353
TURNTABLE MOTOR CONTROL
LM2940T5 BA4558FTI
IC11 13, Q11~16
AC IN
S1
POWER TRANSFORMER
POWER SUPPLY
±10V
±8V
±6V
±5V
-28V
AC4.5V
BA4558FTI
IC13, Q31,32,51
RESET SIGNAL GENERATOR
IC601 MN15283PEM-2 FL DRIVE & TIMING SIGNAL GENERATOR
OSC1/OSC2
RST
P52
S0~8
D0~F
P22/23
EST/PLE/CEM
KEY MATRIX S601~628
P50,51/P40~43
IC603 MN1551PJM-1 REMOTE CONTROL
RST
OSC1
REMO
TIMER SW S651
RSL0006F
FL DISPLAY
TAPE CONTROL
SYNCHRO REC
REMOTE CONTROL RECEIVER
HC-MDIOE
IC602

B0-B3	:	Control bits for radial circuit.
DAC	:	Current output for track jumping. (Digital to Analogue Converted)
DODS	:	Drop out detector supression.
D1-D4	:	Photodiode currents.
FE	:	Focus error signal.
FE lag	:	Focus error signal for LAG network.
HF	:	HF output for DEMOD.
HFD	:	HF detector output for DEMOD.
HF-in	:	HF current input.
LM	:	Laser monitor diode input.
LO	:	Laser amplifier current output.
RE	:	Radial error signal (amplified RE2 -RE1 currents).
RE1	:	Radial error signal 1 (summation of amplified currents D3 and D4).
RE2	:	Radial error signal 2 (summation of amplified currents D1 and D2).
RE dig	:	Radial error digital.
RE lag	:	Radial error signal for LAG network
RPU	:	Radial puls after track jumping.
Si/RD	:	On/off control for laser supply and focus circuit.
TL	:	Track loss signal.
Div4	:	Radial error digital devided by four.
RF	:	Data
DO	:	Drop-out detection signal (Active High)
SRF	:	Sliced RF signal.
EFM	:	Modulation data.
PCK	:	PLL extract clock (4.2336MHz)
FPC	:	PLL frequency comparison signal
STAT	:	Status command for CRC etc.
DMUTE	:	Data mute command
MDATA	:	Mode control data
MLD	:	Load command for mode control data (Active Low)
MCLK	:	Data clock for MDATA
SUBQ	:	Sub-code Q data
CLDCK	:	Data frame clock (7.35KHz)
BLKCK	:	Sub-code Q data block clock (75 Hz)
RST	:	Reset command (Active Low)
TRON	:	Tracking servo ON command (Active Low)
EC	:	Spindle motor drive signal
PC	:	Spindle motor ON command (Active Low)
SMCK	:	System clock (4.2336MHz)
OE	:	Read out enable
WE	:	Write enable
LRCK	:	L/R data discrimination clock (88.2KHz)
SRDATA	:	Serial data output (MSB first)
SCK	:	Serial bit clock (2.82MHz)
MEMP	:	Deemphasis command (Active High)

Note)
•——▶ Audio signal.

■ INTERNAL CONNECTION OF FL

• Grid connection diagram


16G
15G
14G
13G
12G
11G
10G
9G
PROGRAM
CANCEL
TRACK
MIN
NO.
SEC
PEAK SEARCH
WARP
LINK
SCAN
EDIT
SIDE A
SIDE B
15
30
45
60
75
90
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
a
b
c
d
e
f
g
h
i
j
8G
7G
6G
5G
4G
3G
2G
1G

• Anode connection table

	16G	15G	14G	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	a	a	a	a	a	a	▷	WARP	1	3	5	7	9	11	13	15
b	b	b	b	b	b	b	❚❚	LINK	⊓ 2	⊓ 4	⊓ 6	⊓ 8	⊓ 10	⊓ 12	⊓ 14	⊓ ▶
c	c	c	c	c	c	c	↺	–	⊔ 1	⊔ 3	⊔ 5	⊔ 7	⊔ 9	⊔ 11	⊔ 13	⊔ 15
d	d	d	d	d	d	d	–	–	⊓	⦀	⦀	⦀	⦀	⦀	⦀	–
e	e	e	e	e	e	e	PEAK	–	2	4	6	8	10	12	14	▶
f	f	f	f	f	f	f	SEARCH	SCAN	⊓ 1	⊓ 3	⊓ 5	⊓ 7	⊓ 9	⊓ 11	⊓ 13	⊓ 15
g	g	g	g	g	g	g	–	–	⊔ 2	⊔ 4	⊔ 6	⊔ 8	⊔ 10	⊔ 12	⊔ 14	⊔ ▶
h	PROGRAM	–	TRACK	MIN	NO.	SEC	–	–	⊔	⦀	⦀	⦀	⦀	⦀	⦀	–
i	CANCEL	–	—	:	–	–	–	–	SIDE A SIDE B EDIT	⦀	⦀	⦀	⦀	⦀	⦀	–
j	–	–	–	–	–	–	–	–	–	■ ■ 15	■ ■ 30	■ ■ 45	■ ■ 60	■ ■ 75	■ ■ 90	--

■ SCHEMATIC DIAGRAM

(Parts list on pages 41 ~ 48.)

(This schematic diagram may be modified at any time with development of new technology.)

Notes:

- **S1** : Power switch in "on" position.
- **S601** : Disc holder open/close (▲OPEN/CLOSE) switch.
- **S602** : Stop (■STOP) switch.
- **S603** : Pause (❚❚PAUSE) switch.
- **S604** : Play (▶PLAY) switch.
- **S605** : Program (PROGRAM) switch.
- **S606** : Cancel (CANCEL) switch.
- **S607** : Time mode select (TIME MODE) switch.
- **S608** : Repeat (REPEAT) switch.
- **S609** : Recall (RECALL) switch.
- **S610, 611** : Skip/search (SKIP/SEARCH) switches.
- **S612** : Tape-side select (TAPE SIDE A/B) switch.
- **S613** : Edit tape length (EDIT/TAPE LENGTH) switch.
- **S614** : Link (LINK) switch.
- **S615** : Warp (WARP) switch.
- **S616** : Music scan (SCAN) switch.
- **S617 ~ 628** : Numeric (+10, 0, 1 ~ 10) switches.
  - [S617: 1, S618: 2, S619: 3, S620: 4,
  - S621: 5, S622: 6, S623: 7, S624: 8,
  - S625: 9, S626: 10, S627: +10, S628: 0]
- **S651** : Timer (TIMER) switch.
- **S1001** : Tray (OPEN/CLOSE) switch.

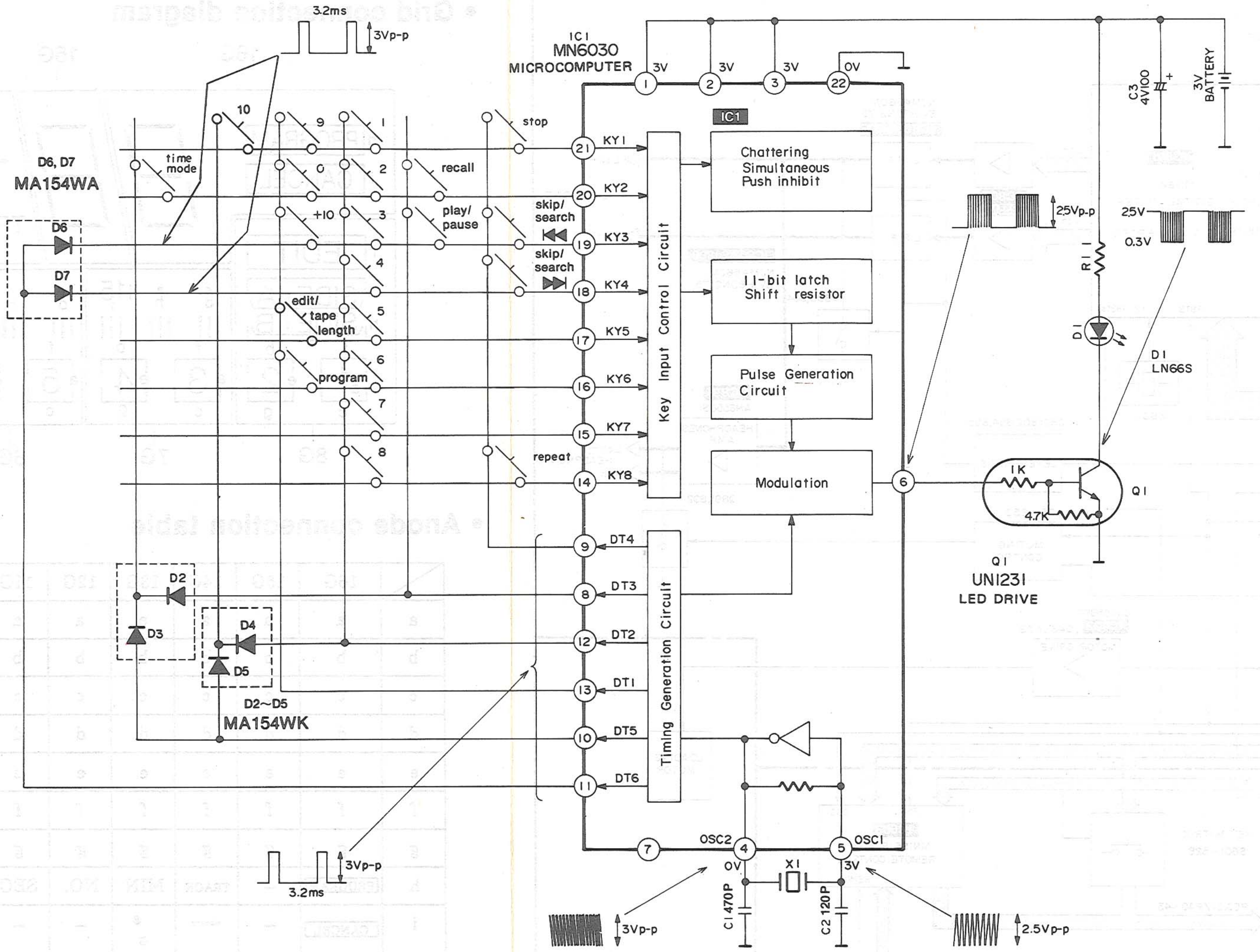
- The voltage value and waveforms are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis.
  Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
  *The parenthesized are the values of voltage generated during playing (Test disc 1kHz, L+R, 0dB), others are voltage values in stop mode.
- Important safety notice:
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- ≻─≺ ≻─/─≺ ≻─: Positive voltage lines and negative voltage lines.
  ⇛ : Audio signal lines.

Caution!

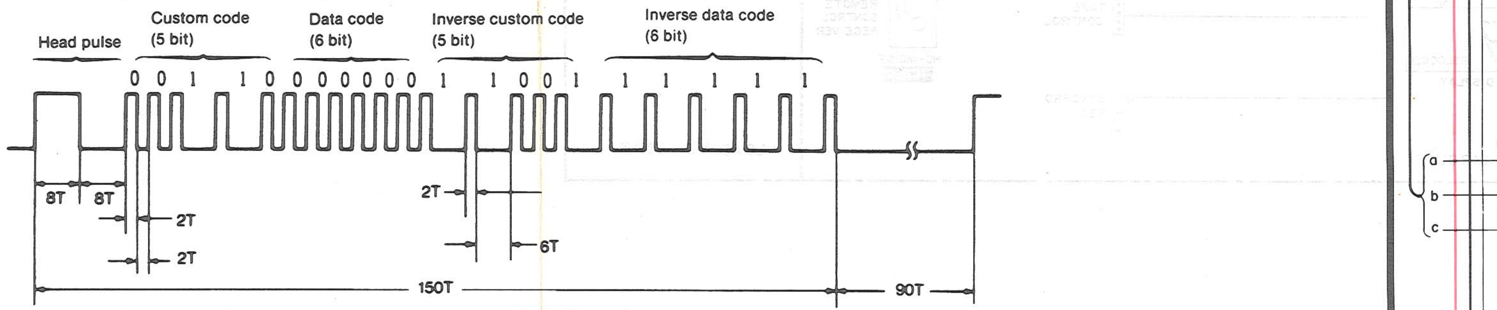
IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.

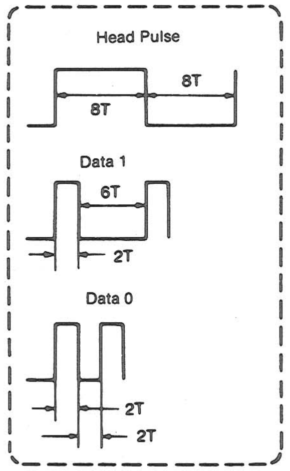
● Remote-control transmitter


3.2ms
3Vp-p
IC1
MN6030
MICROCOMPUTER
3V
0V
D6, D7
MA154WA
D6
D7
time mode
10
9
1
0
2
+10
3
4
5
6
7
8
edit/tape length
program
recall
play/pause
stop
skip/search
repeat
KY1
KY2
KY3
KY4
KY5
KY6
KY7
KY8
DT4
DT3
DT2
DT1
DT5
DT6
Key Input Control Circuit
Timing Generation Circuit
Chattering Simultaneous Push inhibit
11-bit latch Shift resistor
Pulse Generation Circuit
Modulation
D2
D3
D4
D5
D2~D5
MA154WK
OSC2
OSC1
X1
C1 470P
C2 120P
3Vp-p
2.5Vp-p
C3 4V100
3V BATTERY
25Vp-p
25V
0.3V
R1 1
D1
D1 LN66S
1K
47K
Q1
Q1
UN1231
LED DRIVE

● Key number description and data code


Head pulse
Custom code (5 bit)
Data code (6 bit)
Inverse custom code (5 bit)
Inverse data code (6 bit)
0 0 1 1 0 0 0 0 0 0 0 1 1 0 0 1 1 1 1 1 1
8T
8T
2T
2T
2T
6T
150T
90T

*1T=0.454ms~0.460ms

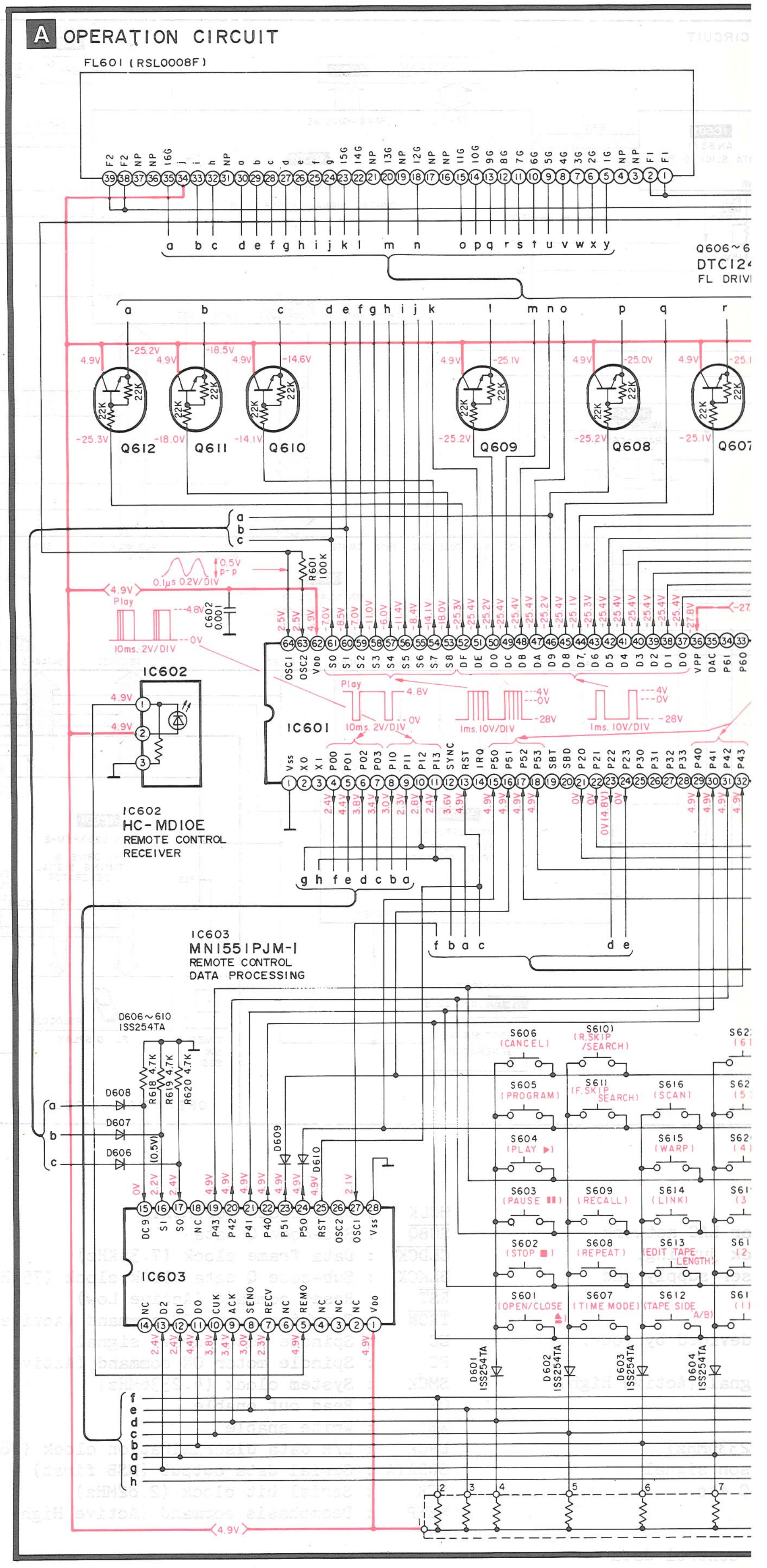

Head Pulse
8T
8T
Data 1
6T
2T
Data 0
2T
2T

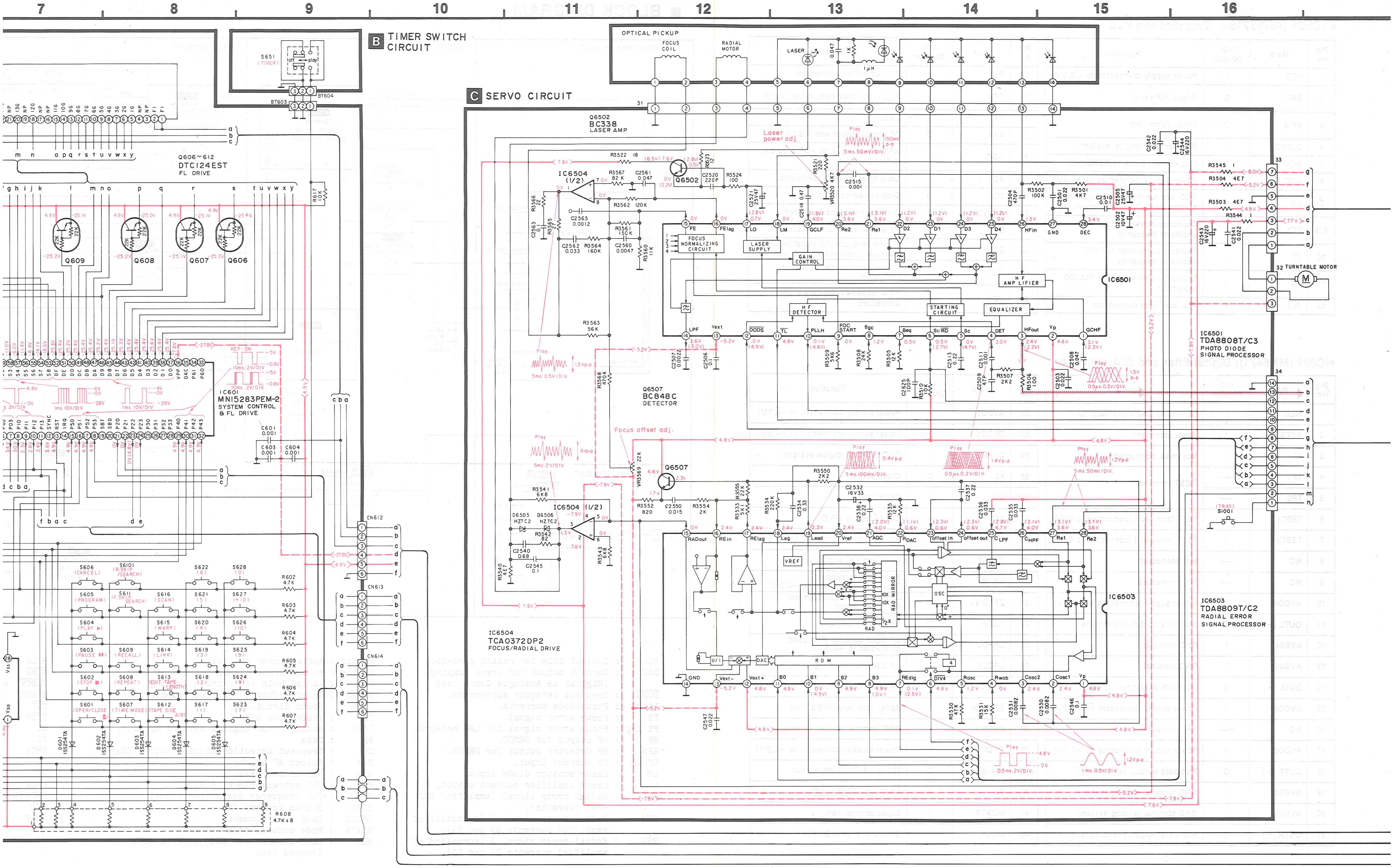
Function	Data Code
■ stop	000000
◀◀ skip/ search	000010
▶▶ skip/ search	000011
repeat	000111
recall	001001
▶❚❚ play/ pause	001010

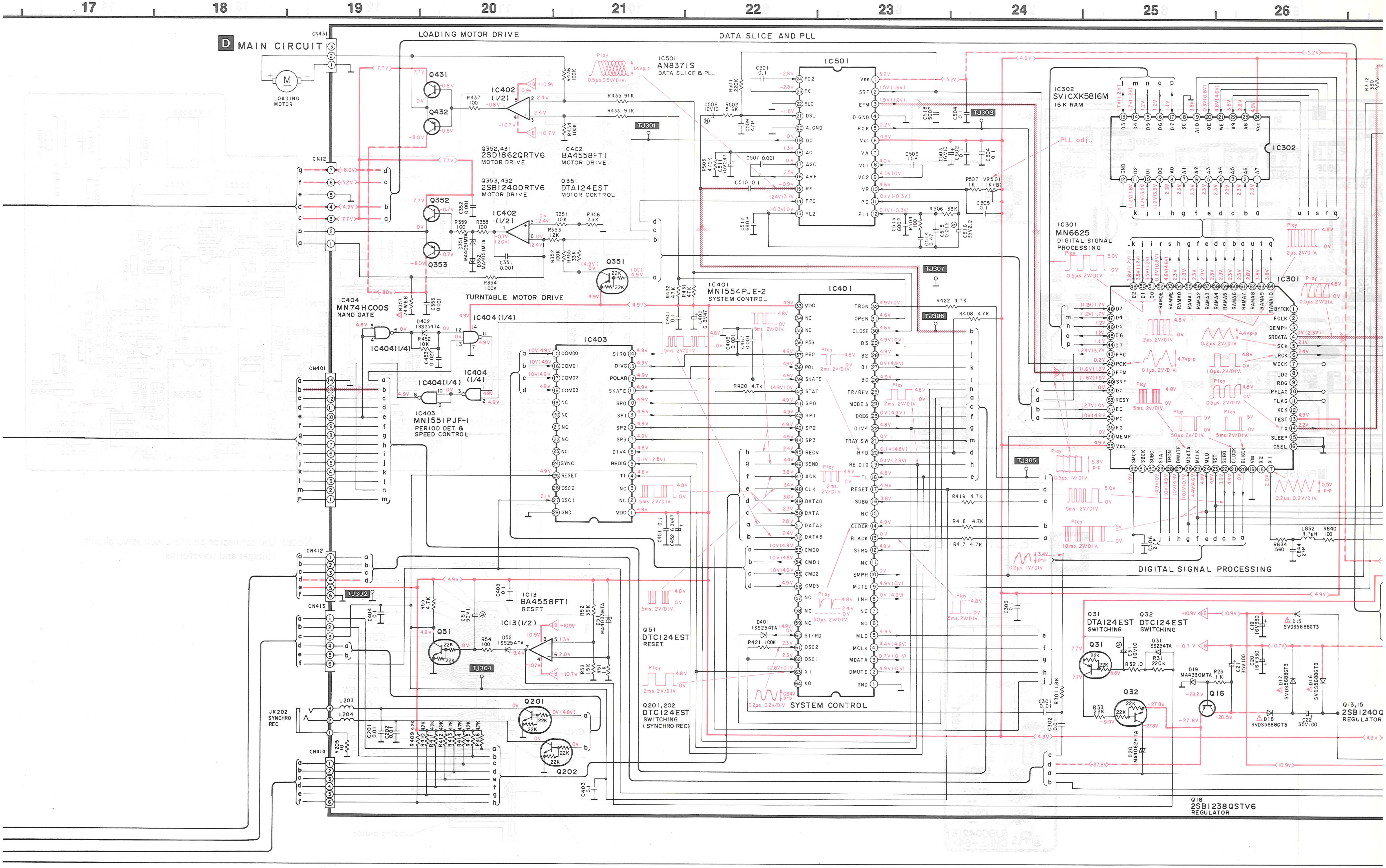
*Custom Code: 01100

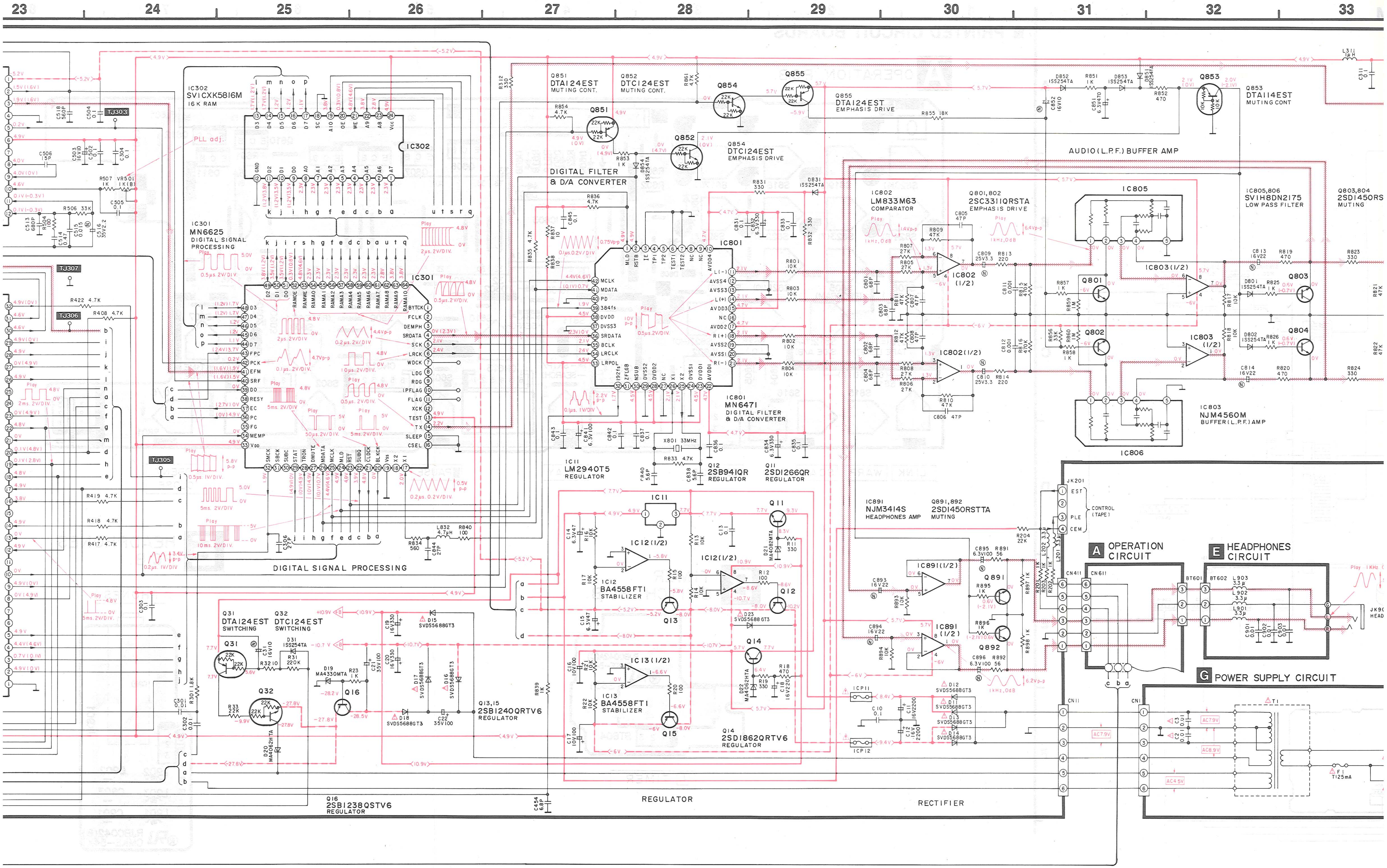
Function	Data Code
1	010000
2	010001
3	010010
4	010011
5	010100
6	010101
7	010110
8	010111

Function	Data Code
9	011000
0	011001
+10	011010
edit/tape length	011100
program	011101
time mode	101001
10	110000

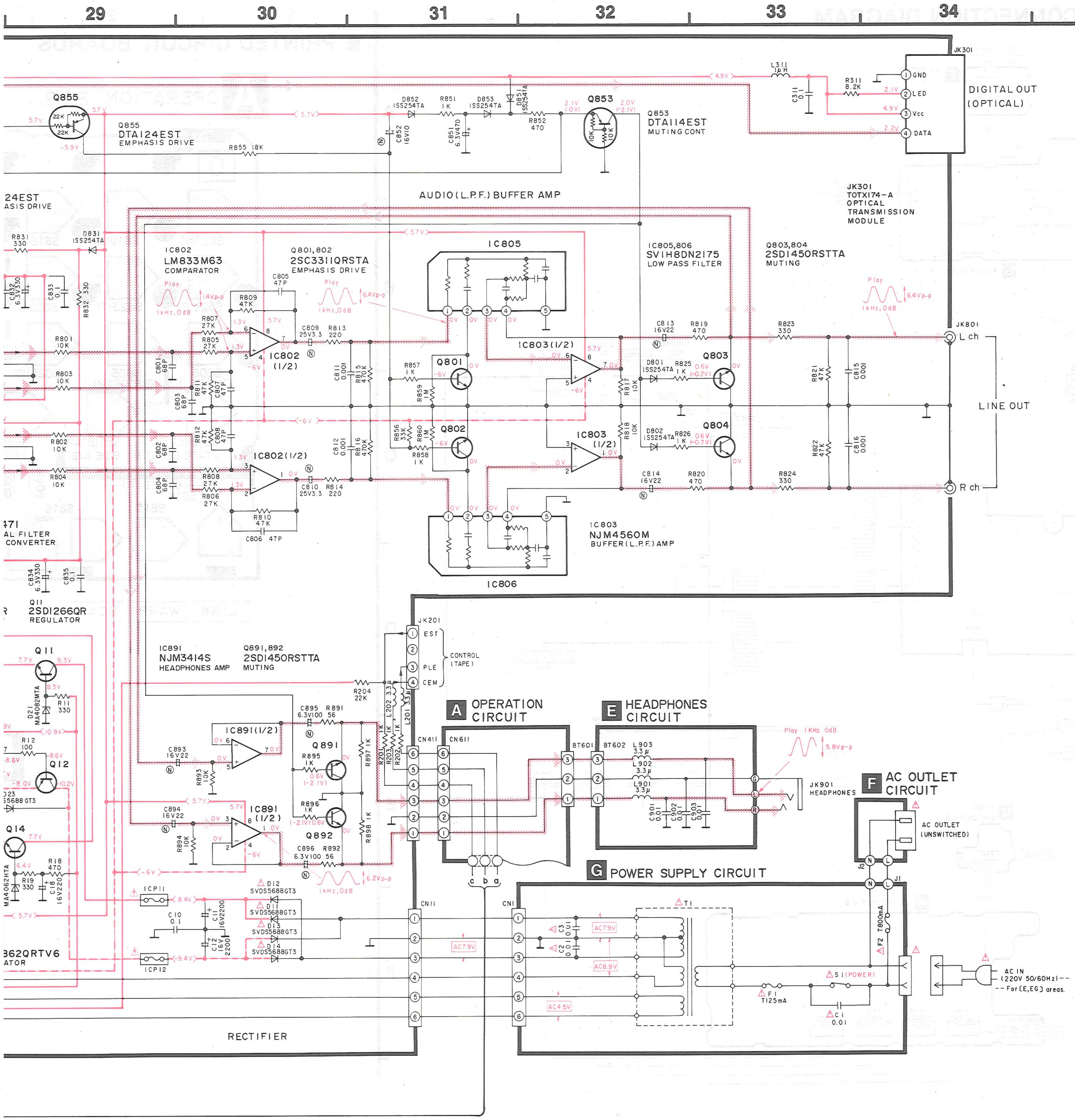

A OPERATION CIRCUIT
FL601 (RSL0008F)
Q606~6
DTC124
FL DRIV
Q612
Q611
Q610
Q609
Q608
Q607
IC601
IC602
IC602
HC-MD10E
REMOTE CONTROL
RECEIVER
IC603
MN1551PJM-1
REMOTE CONTROL
DATA PROCESSING
D606~610
1SS254TA
D608
D607
D606
R618 4.7K
R619 4.7K
R620 4.7K
R601 100K
C602 0.01
S606 (CANCEL)
S6101 (R.SKIP/SEARCH)
S605 (PROGRAM)
S611 (F.SKIP/SEARCH)
S616 (SCAN)
S604 (PLAY ▶)
S615 (WARP)
S603 (PAUSE ❚❚)
S609 (RECALL)
S614 (LINK)
S602 (STOP ■)
S608 (REPEAT)
S613 (EDIT TAPE LENGTH)
S601 (OPEN/CLOSE)
S607 (TIME MODE)
S612 (TAPE SIDE A/B)
D601 1SS254TA
D602 1SS254TA
D603 1SS254TA
D604 1SS254TA
Play
10ms 2V/DIV
1ms 10V/DIV
0.1μs 0.2V/DIV
4.9V


B TIMER SWITCH CIRCUIT
S651 (TIMER)
off
play
BT604
BT603
C SERVO CIRCUIT
OPTICAL PICKUP
FOCUS COIL
RADIAL MOTOR
LASER
Q6502 BC338 LASER AMP
Laser power adj.
IC6504 (1/2)
Q6606~612 DTC124EST FL DRIVE
Q609
Q608
Q607
Q606
IC601 MN15283PEM-2 SYSTEM CONTROL & FL DRIVE
KEY ON
FOCUS NORMALIZING CIRCUIT
LASER SUPPLY
GAIN CONTROL
HF DETECTOR
STARTING CIRCUIT
EQUALIZER
HF AMPLIFIER
IC6501
IC6501 TDA8808T/C3 PHOTO DIODE SIGNAL PROCESSOR
TURNTABLE MOTOR
Q6507 BC848C DETECTOR
Focus offset adj.
Q6507
IC6504 (1/2)
IC6503
IC6503 TDA8809T/C2 RADIAL ERROR SIGNAL PROCESSOR
IC6504 TCA0372DP2 FOCUS/RADIAL DRIVE
RAD MIRROR
OSC
ROM
DAC
VREF
(TRAY) S1001
CN612
CN613
CN614
S606 (CANCEL)
S610 (R.SKIP /SEARCH)
S622 (6)
S628 (0)
S605 (PROGRAM)
S611 (F.SKIP /SEARCH)
S616 (SCAN)
S621 (5)
S627 (+10)
S604 (PLAY ▶)
S615 (WARP)
S620 (4)
S626 (10)
S603 (PAUSE ▮▮)
S609 (RECALL)
S614 (LINK)
S619 (3)
S625 (9)
S602 (STOP ■)
S608 (REPEAT)
S613 (EDIT TAPE LENGTH)
S618 (2)
S624 (8)
S601 (OPEN/CLOSE ⏏)
S607 (TIME MODE)
S612 (TAPE SIDE A/B)
S617 (1)
S623 (7)
R602 4.7K
R603 4.7K
R604 4.7K
R605 4.7K
R606 4.7K
R607 4.7K
R608 4.7K x 8
D601 ISS254TA
D602 ISS254TA
D603 ISS254TA
D604 ISS254TA
D605 ISS254TA
Play
5ms.0.5V/DIV.
5ms.2V/DIV.
5ms.100mV/DIV.
0.5μs.0.2V/DIV.
5ms.500mV/DIV.
0.5ms.2V/DIV.
1ms.0.5V/DIV.
0.5μs.0.5V/DIV.
5ms.50mV/DIV.

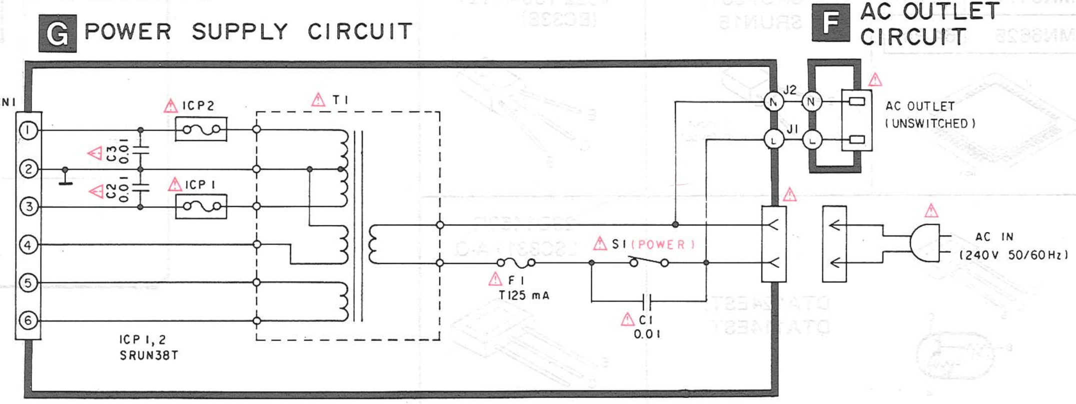

17
18
19
20
21
22
23
24
25
26
D MAIN CIRCUIT
LOADING MOTOR DRIVE
DATA SLICE AND PLL
LOADING MOTOR
CN431
CN12
CN401
CN412
CN413
CN414
JK202 SYNCHRO REC
Q431
Q432
Q352
Q353
Q351
Q352,431 2SD1862QRTV6 MOTOR DRIVE
Q353,432 2SB1240QRTV6 MOTOR DRIVE
IC402 BA4558FT1 MOTOR DRIVE
Q351 DTA124EST MOTOR CONTROL
IC402 (1/2)
TURNTABLE MOTOR DRIVE
IC404 MN74HC00S NAND GATE
IC404(1/4)
IC403 MN1551PJF-1 PERIOD DET.& SPEED CONTROL
IC403
IC501 AN8371S DATA SLICE & PLL
IC501
IC401 MN1554PJE-2 SYSTEM CONTROL
IC401
SYSTEM CONTROL
IC302 SVICXK5816M 16K RAM
IC302
IC301 MN6625 DIGITAL SIGNAL PROCESSING
IC301
DIGITAL SIGNAL PROCESSING
PLL adj.
IC13 BA4558FT1 RESET
IC13(1/2)
Q51
Q51 DTC124EST RESET
Q201
Q202
Q201,202 DTC124EST SWITCHING (SYNCHRO REC)
Q31 DTA124EST SWITCHING
Q32 DTC124EST SWITCHING
Q16
Q16 2SB1238QSTV6 REGULATOR
Q13,15 2SB1240Q REGULATOR
TJ301
TJ302
TJ303
TJ304
TJ305
TJ306
TJ307



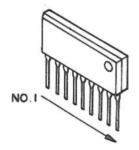
23
24
25
26
27
28
29
30
31
32
33
IC302 SV1CXK5816M 16K RAM
IC301 MN6625 DIGITAL SIGNAL PROCESSING
PLL adj.
TJ303
TJ307
TJ306
TJ305
DIGITAL SIGNAL PROCESSING
Q851 DTA124EST MUTING CONT.
Q852 DTC124EST MUTING CONT.
Q854 DTC124EST EMPHASIS DRIVE
Q855 DTA124EST EMPHASIS DRIVE
Q853 DTA114EST MUTING CONT
AUDIO (L.P.F.) BUFFER AMP
DIGITAL FILTER & D/A CONVERTER
IC801 MN6471 DIGITAL FILTER & D/A CONVERTER
IC802 LM833M63 COMPARATOR
Q801,802 2SC3311QRSTA EMPHASIS DRIVE
IC805
IC805,806 SV1H8DN2175 LOW PASS FILTER
Q803,804 2SD1450RS MUTING
IC803 NJM4560M BUFFER (L.P.F.) AMP
IC806
X801 33MHz
IC11 LM2940T5 REGULATOR
Q12 2SB941QR REGULATOR
Q11 2SD1266QR REGULATOR
IC891 NJM3414S HEADPHONES AMP
Q891,892 2SD1450RSTTA MUTING
JK201
EST
PLE
CEM
CONTROL (TAPE)
A OPERATION CIRCUIT
E HEADPHONES CIRCUIT
G POWER SUPPLY CIRCUIT
IC12 BA4558FT1 STABILIZER
IC13 BA4558FT1 STABILIZER
Q31 DTA124EST SWITCHING
Q32 DTC124EST SWITCHING
Q13,15 2SB1240QRTV6 REGULATOR
Q14 2SD1862QRTV6 REGULATOR
Q16 2SB1238QSTV6 REGULATOR
REGULATOR
RECTIFIER
CN411
CN611
BT601
BT602
CN11
CN1
T1
F1 T125mA
ICP11
ICP12


29
30
31
32
33
34
35
36
37
38
Q855
DTA124EST
EMPHASIS DRIVE
R855 18K
D852 1SS254TA
R851 1K
D853 1SS254TA
D851 1SS254TA
C852 16V10
C851 6.3V470
R852 470
Q853
Q853
DTA114EST
MUTING CONT
L311
C311 0.1
R311 8.2K
JK301
GND
LED
Vcc
DATA
DIGITAL OUT (OPTICAL)
JK301
TOTX174-A
OPTICAL
TRANSMISSION
MODULE
AUDIO (L.P.F.) BUFFER AMP
24EST
ASIS DRIVE
R831 330
D831 1SS254TA
IC802
LM833M63
COMPARATOR
Q801, 802
2SC3311QRSTA
EMPHASIS DRIVE
IC805
IC805, 806
SV1H8DN2175
LOW PASS FILTER
Q803, 804
2SD1450RSTTA
MUTING
C805 47P
R809 47K
R807 27K
R805 27K
R801 10K
R803 10K
C801 68P
C803 68P
R811 47K
C807 47P
IC802 (1/2)
C809 25V3.3
R813 220
C811 0.001
R815 470K
R857 1K
R859 1M
Q801
IC803 (1/2)
C813 16V22
R819 470
D801 1SS254TA
R825 1K
Q803
R817 10K
R823 330
R821 47K
C815 0.001
JK801
L ch
LINE OUT
R ch
R802 10K
R804 10K
C802 68P
C804 68P
R812 47K
C808 47P
R808 27K
R806 27K
IC802 (1/2)
R810 47K
C806 47P
C810 25V3.3
R814 220
C812 0.001
R816 470K
R856 33K
R860 1M
R858 1K
Q802
IC803 (1/2)
R818 10K
D802 1SS254TA
R826 1K
Q804
C814 16V22
R820 470
R822 47K
C816 0.001
R824 330
IC806
IC803
NJM4560M
BUFFER (L.P.F.) AMP
Play 1kHz, 0dB 1.4Vp-p
Play 1kHz, 0dB 6.4Vp-p
Play 1kHz, 0dB 6.4Vp-p
471
AL FILTER
CONVERTER
C832 6.3V330
C833 0.1
R832 330
C834 6.3V330
C835 0.1
Q11
2SD1266QR
REGULATOR
IC891
NJM3414S
HEADPHONES AMP
Q891, 892
2SD1450RSTTA
MUTING
JK201
EST
PLE
CEM
CONTROL (TAPE)
R204 22K
L202 3.3μ
L201 3.3μ
Q11
R11 330
D21 MA4082MTA
R12 100
Q12
D23 SVDS5688GT3
Q14
R18 470
R19 330
C18 16V220
MA4062HTA
362QRTV6
ATOR
IC891 (1/2)
C893 16V22
R893 10K
C895 6.3V100
R891 56
Q891
R895 1K
R897 1K
R201 1K
R202 1K
R203 1K
C894 16V22
R894 10K
IC891 (1/2)
R896 1K
Q892
C896 6.3V100
R892 56
R898 1K
CN411
CN611
A OPERATION CIRCUIT
E HEADPHONES CIRCUIT
BT601
BT602
L903 3.3μ
L902 3.3μ
L901 3.3μ
C901 0.01
C902 0.01
C903 0.01
JK901 HEADPHONES
Play 1KHz 0dB 5.8Vp-p
Play 1kHz, 0dB 6.2Vp-p
F AC OUTLET CIRCUIT
AC OUTLET (UNSWITCHED)
J2
J1
ICP11
ICP12
C10 0.1
C11 16V2200
C12 16V2200
D12 SVDS5688GT3
D11 SVDS5688GT3
D13 SVDS5688GT3
D14 SVDS5688GT3
CN11
CN1
G POWER SUPPLY CIRCUIT
C3 0.01
C2 0.01
AC7.9V
AC8.9V
AC4.5V
T1
F2 T800mA
F1 T125mA
S1 (POWER)
C1 0.01
AC IN (220V 50/60Hz) -- For (E, EG) areas.
RECTIFIER
c b a

For (EB) area.

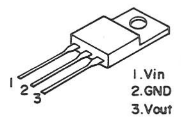

G POWER SUPPLY CIRCUIT
F AC OUTLET CIRCUIT
CN1
ICP2
T1
C3 0.01
C2 0.01
ICP1
J2
J1
AC OUTLET (UNSWITCHED)
S1 (POWER)
F1 T125 mA
C1 0.01
AC IN (240V 50/60Hz)
ICP1, 2
SRUN38T

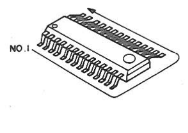
■ TERMINAL GUIDE OF IC's, TRANSISTORS AND DIODES



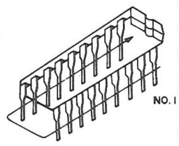
SVIH8DN2175	5 Pin

LM2940T5


1
2
3
1. Vin
2. GND
3. Vout

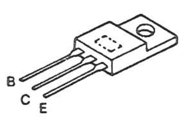


LM833M	8 Pin	AN8371S	24 Pin
NJM4560M		SVICXK5816M	24 Pin
BA4558FT1		4822 209 73234 (TDA8808T)	28 Pin
MN74HC00S	14 Pin	4822 209 73235 (TDA8809T)	
NJM3414M	8 Pin		

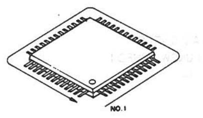


MN15283PEM-2	64 Pin
MN1551PJF-1	28 Pin
MN1554PJE-2	64 Pin
4822 209 72587 (TCA0372)	8 Pin
MN1551PJM-1	28 Pin

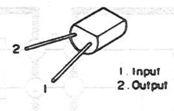
2SB941QR,
2SD1266QR



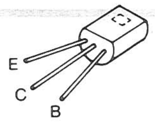
MN6471	42 Pin
MN6625	64 Pin

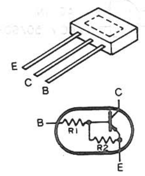


SRUF38T,
SRUN15


2
1
1. Input
2. Output

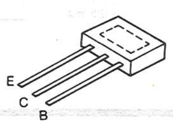
4822 130 44121
(BC338)



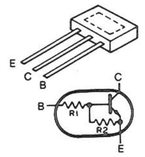

E
C
B
C
B
R1
R2
E

DTA124EST,
DTA114EST

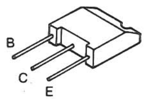
2SD1450R,
2SC3311 A-Q



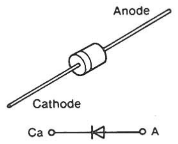
DTC124EST

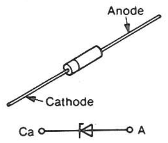

E
C
B
C
B
R1
R2
E

2SB1238QSTV6,
2SD1862QRTV6,
2SB1240-P



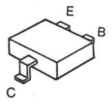
1SS254,
SVDS5688GT3


Anode
Cathode
Ca
A

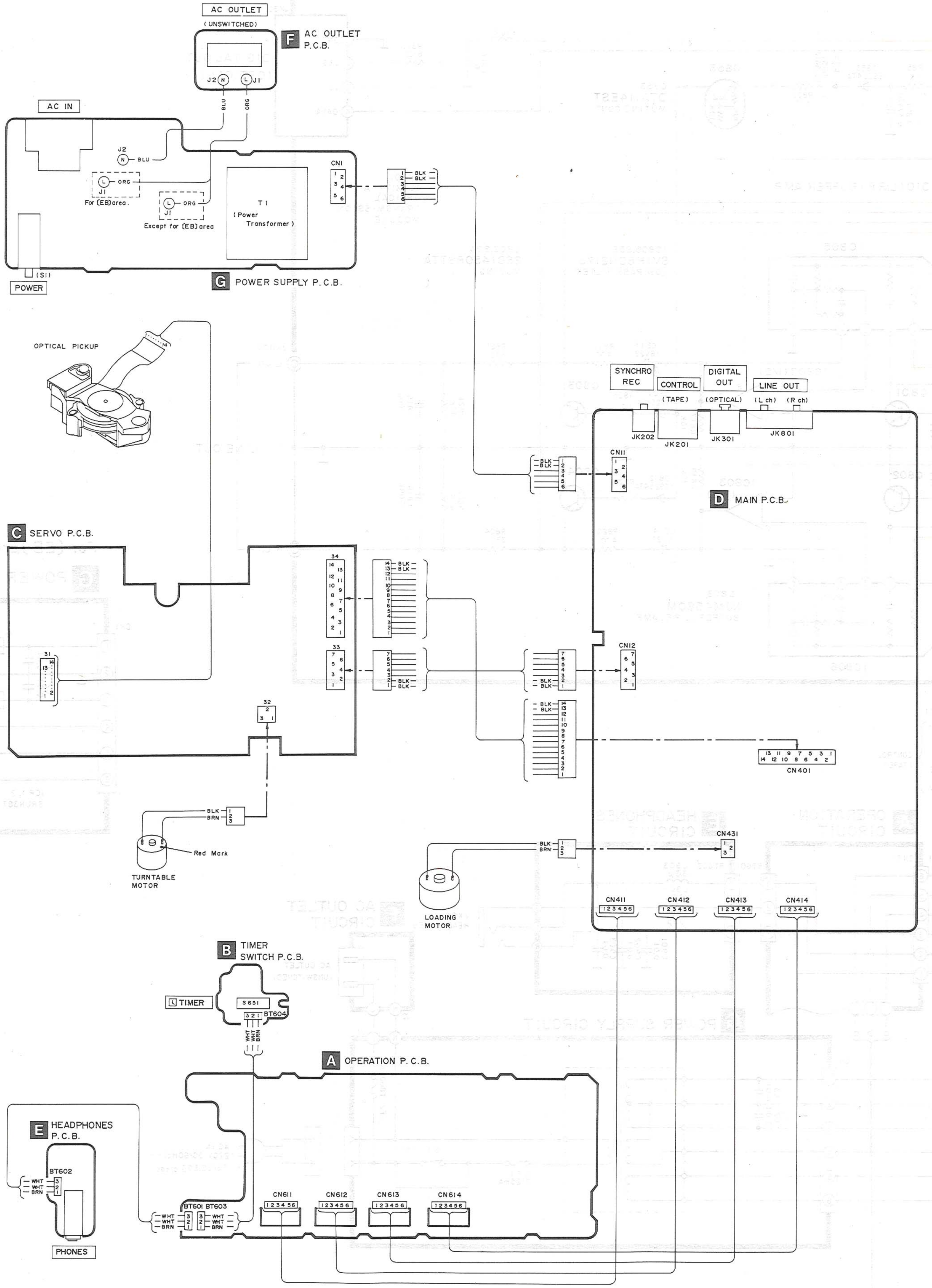

Anode
Cathode
Ca
A

MA4330M,
MA4062H,
MA4033M,
MA4051M,
MA4082M

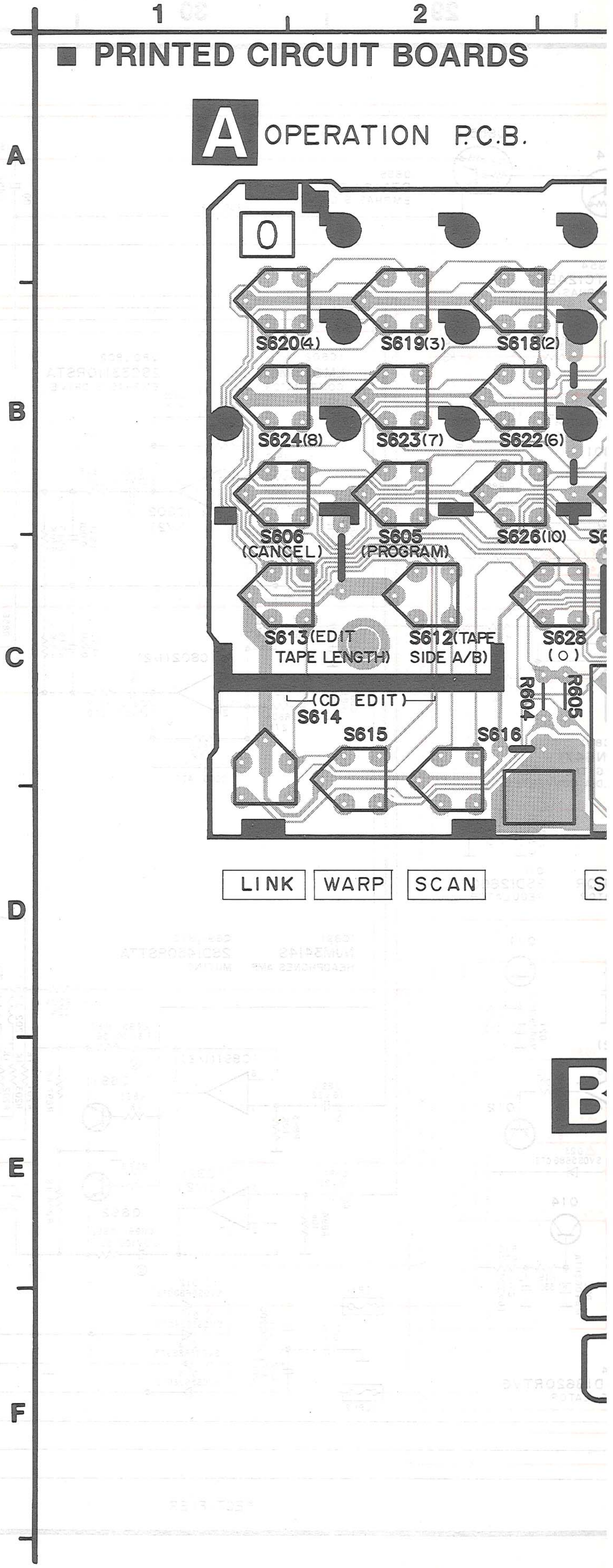
5322 130 42136
(BC848C)



■ WIRING CONNECTION DIAGRAM

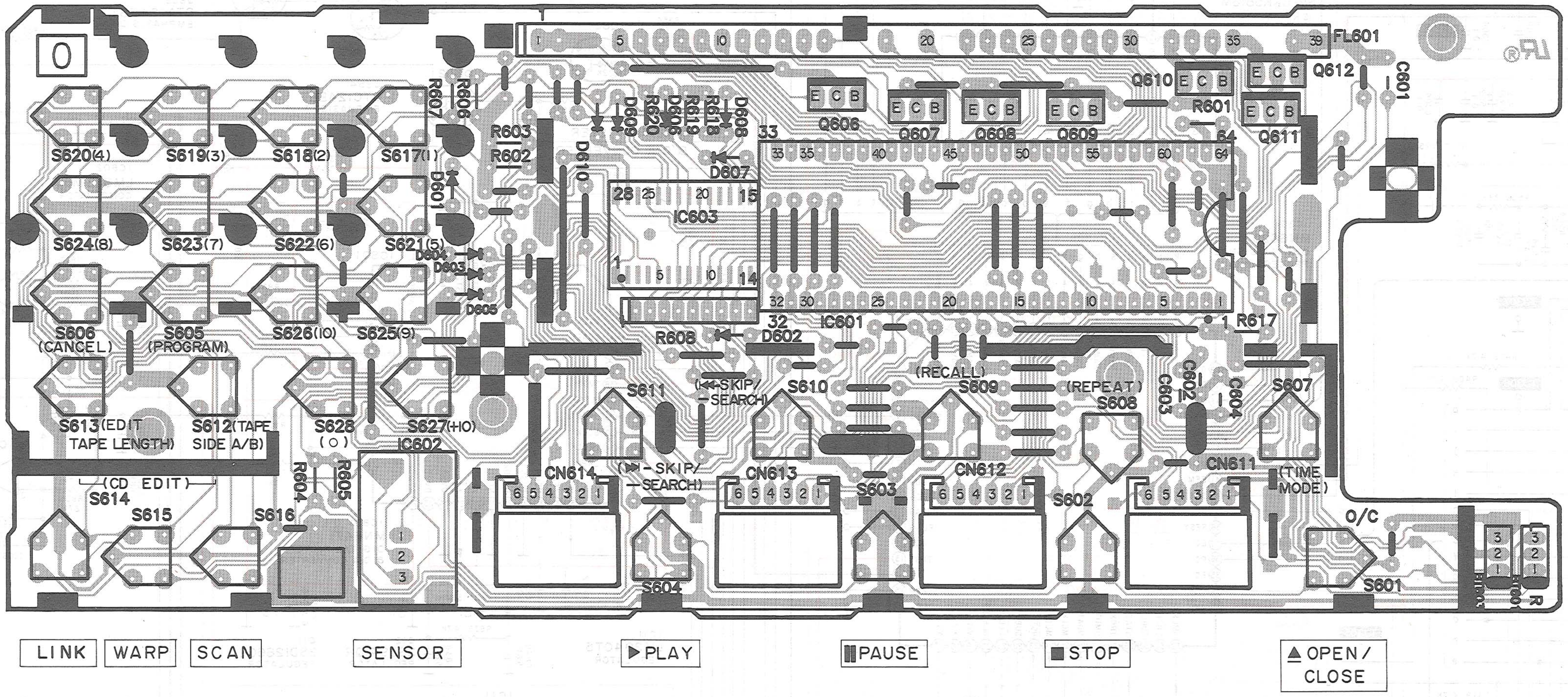

AC OUTLET
(UNSWITCHED)
F AC OUTLET P.C.B.
J2 N
L J1
BLU
ORG
AC IN
J2
N BLU
L ORG
J1
For (EB) area.
L ORG
J1
Except for (EB) area
T1
(Power Transformer)
CN1
BLK
BLK
(S1)
POWER
G POWER SUPPLY P.C.B.
OPTICAL PICKUP
14
C SERVO P.C.B.
34
31
33
32
BLK
BRN
Red Mark
TURNTABLE MOTOR
SYNCHRO REC
CONTROL
(TAPE)
DIGITAL OUT
(OPTICAL)
LINE OUT
(L ch)
(R ch)
JK202
JK201
JK301
JK801
CN11
D MAIN P.C.B.
CN12
CN401
CN431
BLK
BRN
LOADING MOTOR
CN411
CN412
CN413
CN414
B TIMER SWITCH P.C.B.
TIMER
S651
BT604
WHT
WHT
BRN
A OPERATION P.C.B.
E HEADPHONES P.C.B.
BT602
PHONES
BT601
BT603
CN611
CN612
CN613
CN614

■ PRINTED CIRCUIT BOARDS

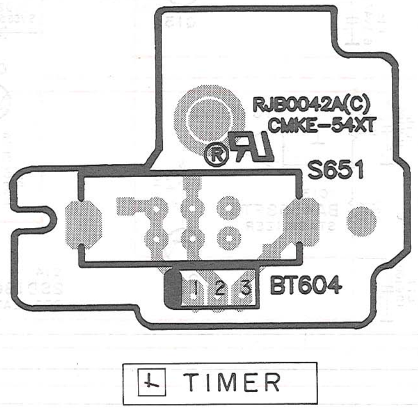

1
2
A
B
C
D
E
F
A OPERATION P.C.B.
0
S620(4)
S619(3)
S618(2)
S624(8)
S623(7)
S622(6)
S606 (CANCEL)
S605 (PROGRAM)
S626(10)
S613(EDIT TAPE LENGTH)
S612(TAPE SIDE A/B)
S628 (○)
R604
R605
(CD EDIT)
S614
S615
S616
LINK
WARP
SCAN
B

■ PRINTED CIRCUIT BOARDS

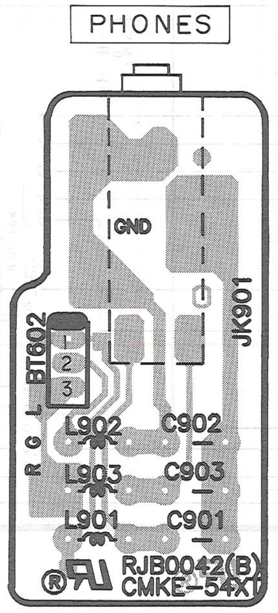
A OPERATION P.C.B.

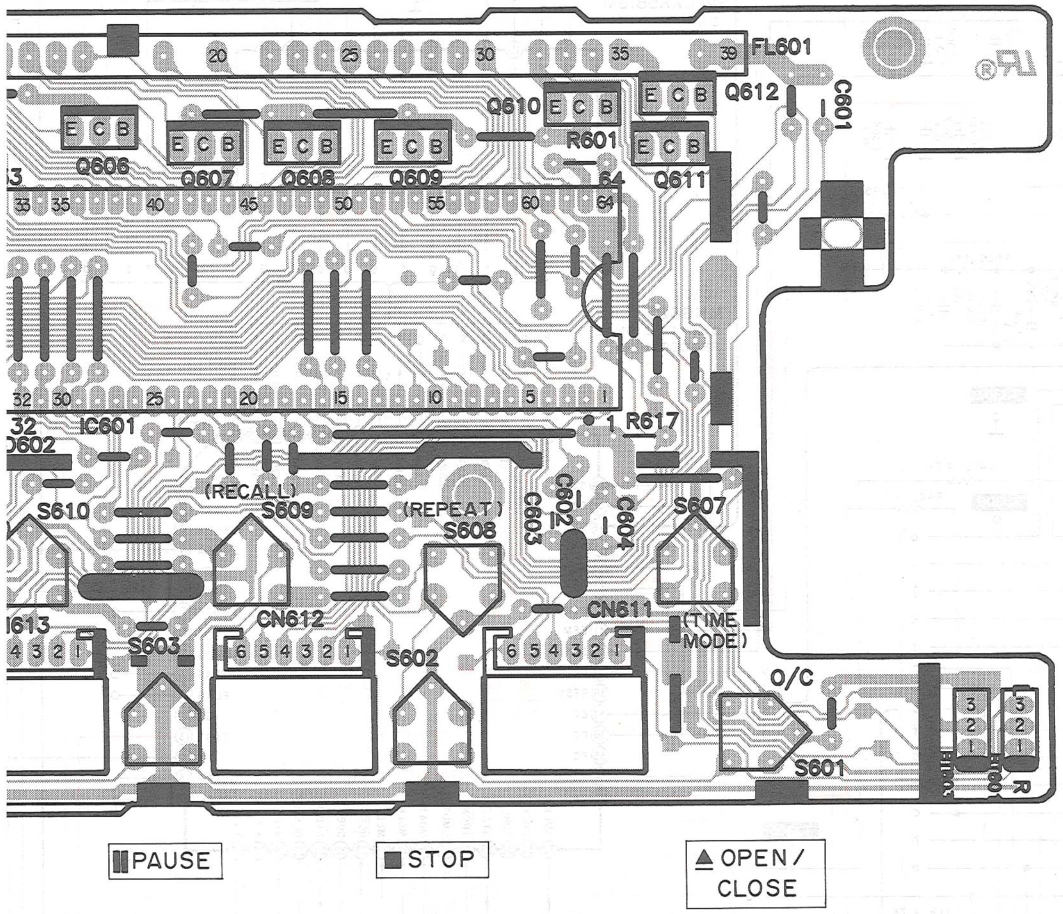

FL601
Q610
Q612
C601
R601
Q611
Q606
Q607
Q608
Q609
R607
R606
R603
R602
D609
R620
D606
R619
R618
D608
D607
D610
IC603
IC601
D601
S620(4)
S619(3)
S618(2)
S617(1)
S624(8)
S623(7)
S622(6)
S621(5)
D604
D603
D605
S606 (CANCEL)
S605 (PROGRAM)
S626(10)
S625(9)
R608
D602
R617
S613(EDIT TAPE LENGTH)
S612(TAPE SIDE A/B)
S628 (○)
S627(HO)
IC602
R604
R605
S611
(◀◀SKIP/ –SEARCH)
S610
(RECALL)
S609
(REPEAT)
S608
C602
C603
C604
S607
CN614
(▶▶–SKIP/ –SEARCH)
CN613
S603
CN612
S602
CN611
(TIME MODE)
(CD EDIT)
S614
S615
S616
S604
O/C
S601
BT603
BT601
R
LINK
WARP
SCAN
SENSOR
▶PLAY
▮▮PAUSE
■STOP
▲OPEN/ CLOSE

B TIMER SWITCH P.C.B.

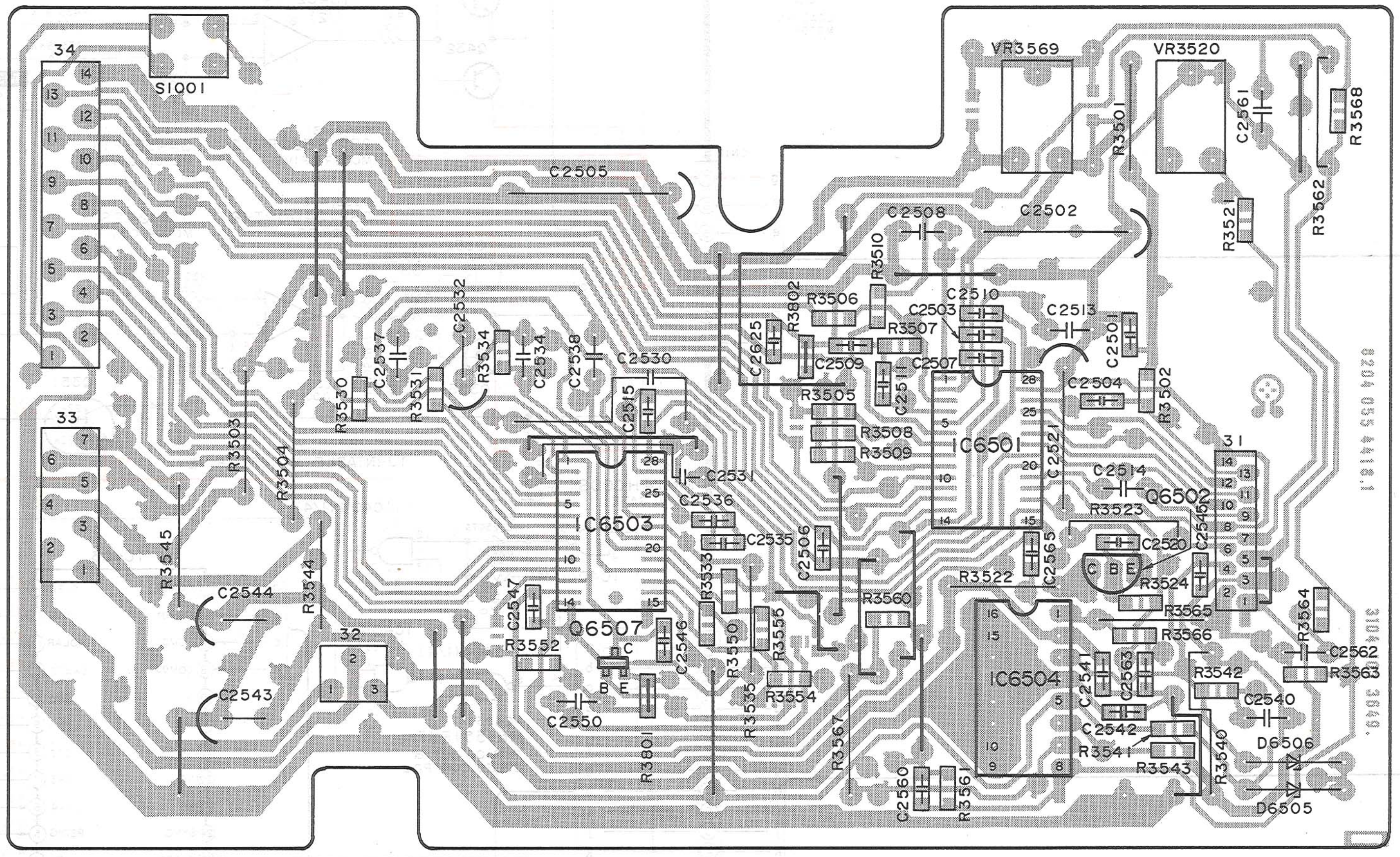

RJB0042A(C)
CMKE-54XT
S651
BT604
TIMER

E HEADPHONES P.C.B.

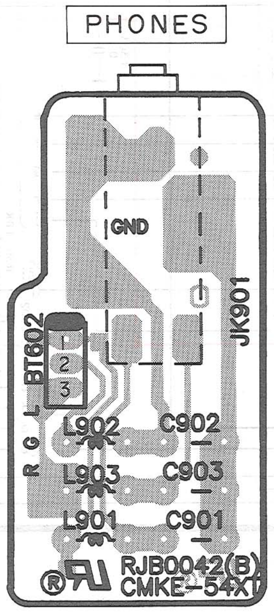

PHONES
GND
JK901
BT602
L902
C902
L903
C903
L901
C901
RJB0042(B)
CMKE-54XT

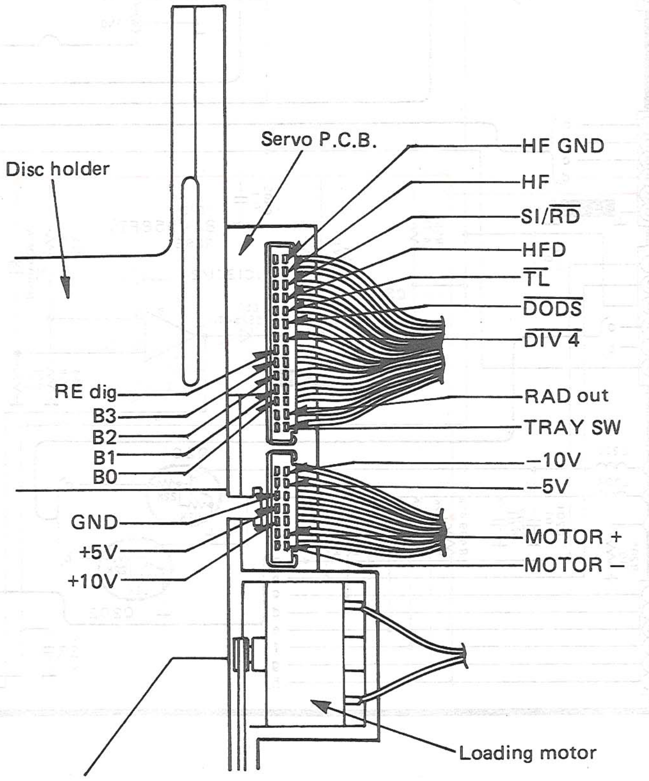

FL601
Q606
Q607
Q608
Q609
Q610
Q611
Q612
R601
C601
IC601
R617
D602
S610
S609
(RECALL)
S608
(REPEAT)
C602
C603
C604
S607
(TIME MODE)
CN611
CN612
I613
S603
S602
S601
O/C
PAUSE
STOP
▲OPEN / CLOSE

C SERVO P.C.B.


S1001
VR3569
VR3520
C2505
C2508
C2502
IC6501
IC6503
IC6504
Q6502
Q6507
C2544
C2543
C2550
D6506
D6505
R3568
R3562
R3521

E HEADPHONES P.C.B.

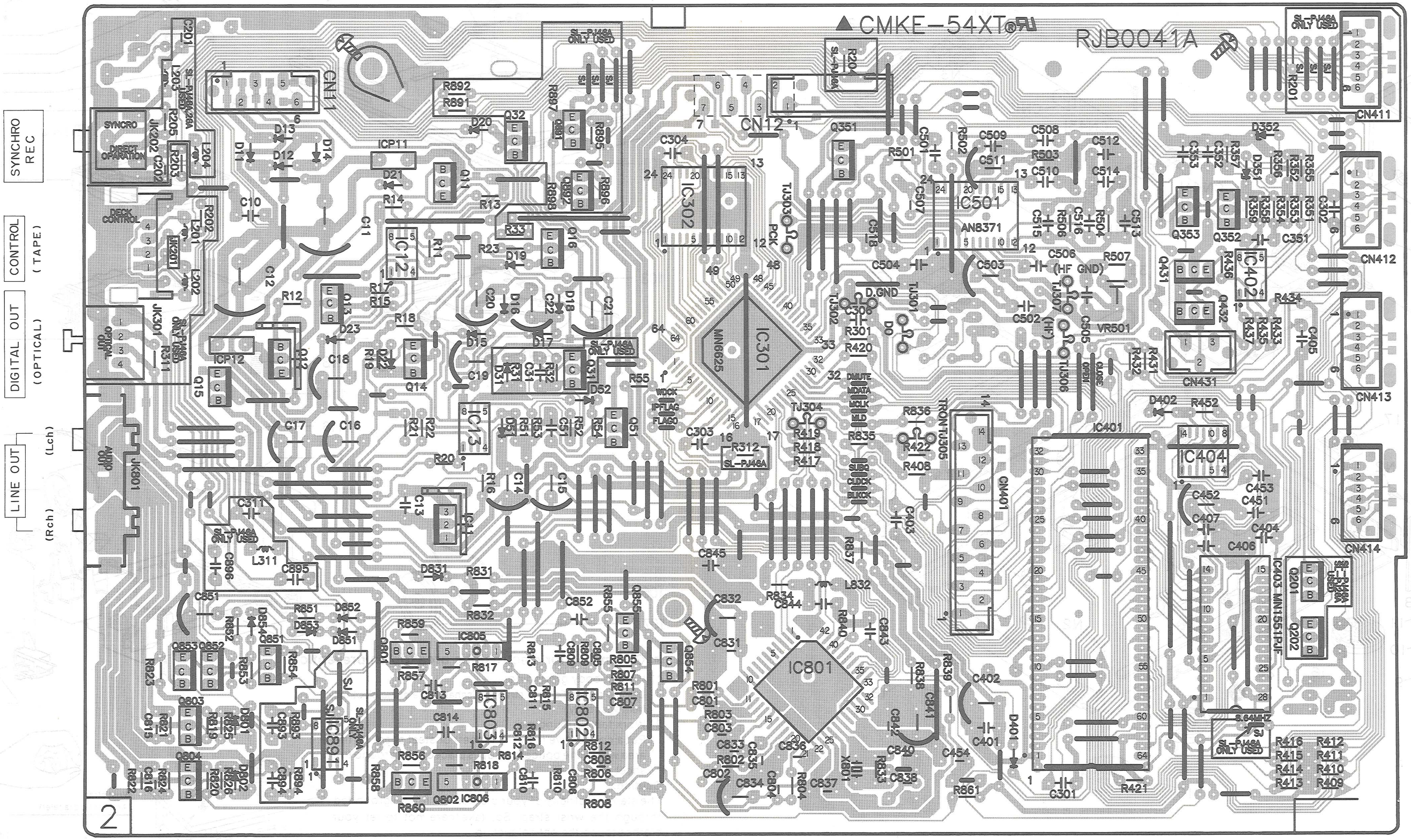

PHONES
GND
JK901
BT602
L902
L903
L901
C902
C903
C901
RJB0042(B)
CMKE-54X1


Disc holder
Servo P.C.B.
HF GND
HF
SI/RD
HFD
TL
DODS
DIV 4
RE dig
B3
B2
B1
B0
RAD out
TRAY SW
–10V
–5V
GND
+5V
+10V
MOTOR +
MOTOR –
Loading motor

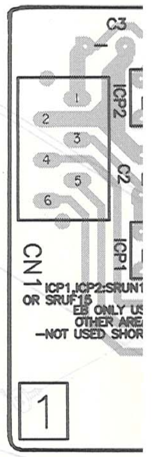
Note: Use connector pins to check servo circuit voltages and waveforms.

15 16 17 18 19 20 21 22 23 24

D MAIN P.C.B.

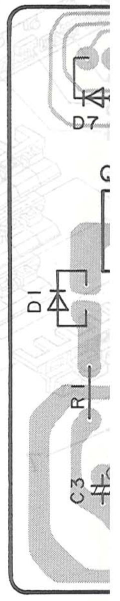

CMKE-54XT
RJB0041A
SYNCHRO REC
CONTROL (TAPE)
DIGITAL OUT (OPTICAL)
LINE OUT (Lch) (Rch)
SYNCRO
DIRECT OPERATION
DECK CONTROL
OPTICAL OUT
AUDIO OUT
JK202
JK201
JK301
JK801
CN11
CN12
CN401
CN411
CN412
CN413
CN414
CN431
IC301 MN6625
IC302
IC501 AN8371
IC401
IC402
IC403 MN1551PJF
IC404
IC801
IC802
IC803
IC805
IC806
IC891
IC11
IC12
IC13
ICP11
ICP12
SL-PJ46A ONLY USED
D.GND
(HF GND)
VR501
8.64MHZ
X801
DMUTE
MDATA
MCLK
MLD
SUBQ
CLDCK
BLKCK
WDCK
IPFLAG
FLAG0
PCK
TRON
2

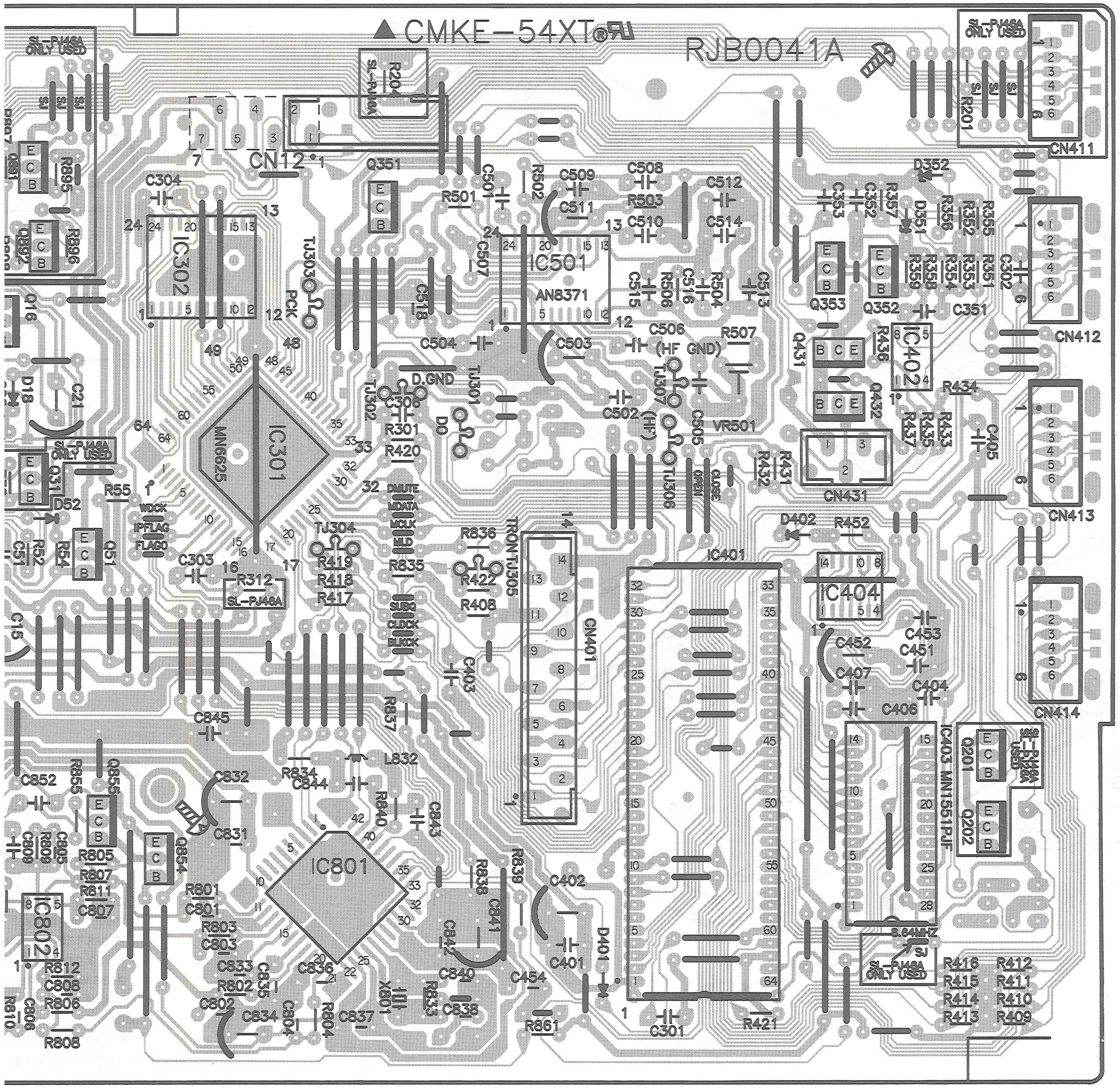
F

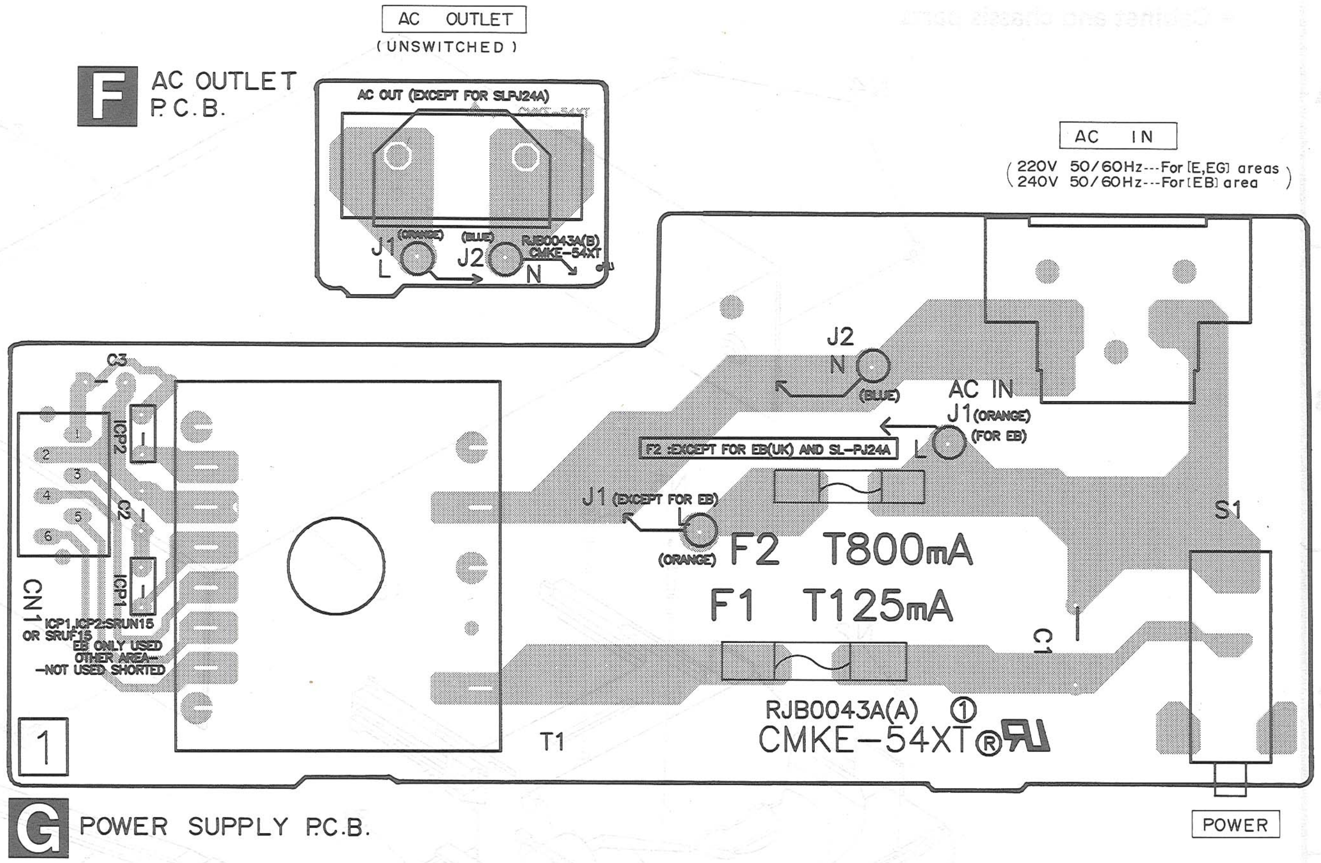

C3
ICP2
C2
ICP1
CN1
ICP1,ICP2:SRUN1
OR SRUF15
EB ONLY US
OTHER ARE
—NOT USED SHOW
1

G POWE

• Remote-c



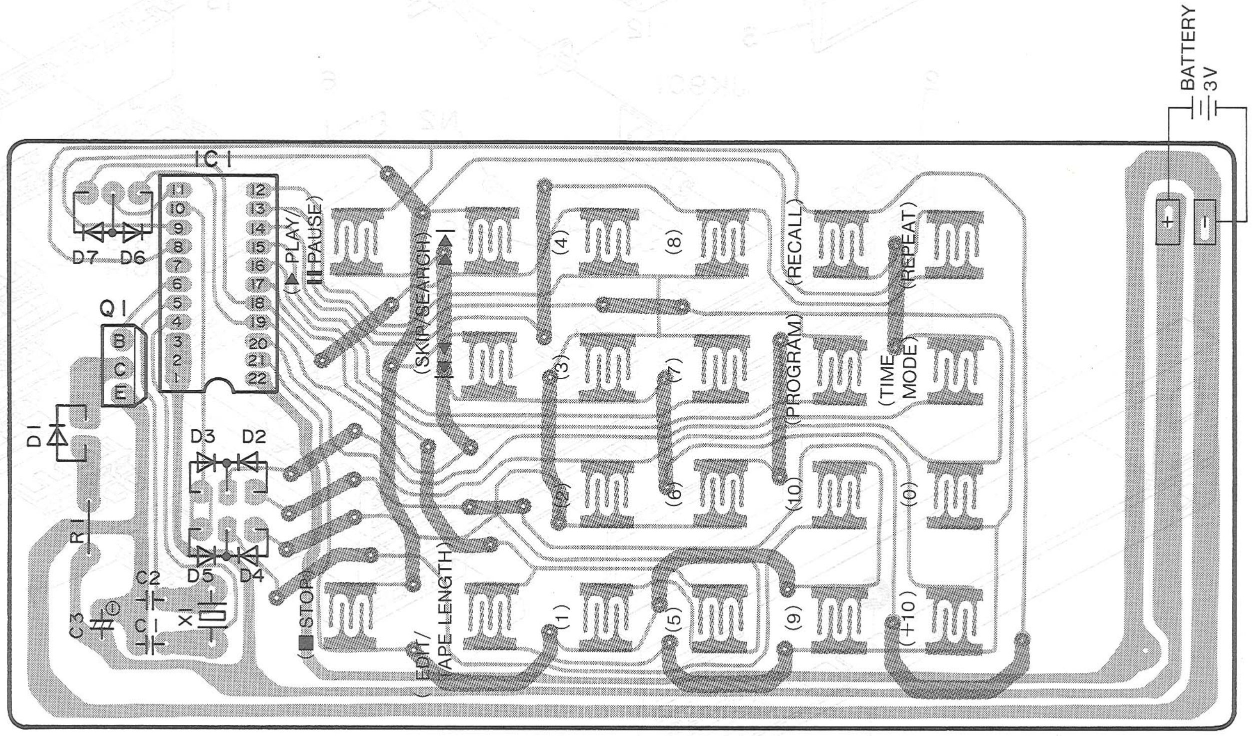

CMKE-54XT
RJB0041A
SL-PJ46A ONLY USED
IC301
MN6625
IC302
IC501
AN8371
IC401
CN401
IC402
IC403 MN1551PJF
IC404
IC801
IC802
CN12
CN411
CN412
CN413
CN414
CN431
Q351
Q352
Q353
Q431
Q432
Q201
Q202
VR501
D.GND
(HF GND)
(HF)
DMUTE
MDATA
MCLK
SUBQ
CLDCK
BLKCK
WDCK
IPFLAG
FLAG0
OPEN
CLOSE
TRON TJ305
4.64MHz
X801


AC OUTLET
(UNSWITCHED)
AC OUT (EXCEPT FOR SL-PJ24A)
J1 (ORANGE) L
J2 (BLUE) N
RJB0043A(B) CMKE-54XT
AC IN
(220V 50/60Hz---For [E, EG] areas)
(240V 50/60Hz---For [EB] area)
J2 N (BLUE)
AC IN J1 (ORANGE) (FOR EB) L
F2 : EXCEPT FOR EB(UK) AND SL-PJ24A
J1 (EXCEPT FOR EB) (ORANGE)
F2 T800mA
F1 T125mA
S1
C1
C2
C3
ICP1
ICP2
CN1
ICP1, ICP2: SRUN15 OR SRUF15
EB ONLY USED OTHER AREA —NOT USED SHORTED
T1
RJB0043A(A) ①
CMKE-54XT
1
POWER

F AC OUTLET P.C.B.

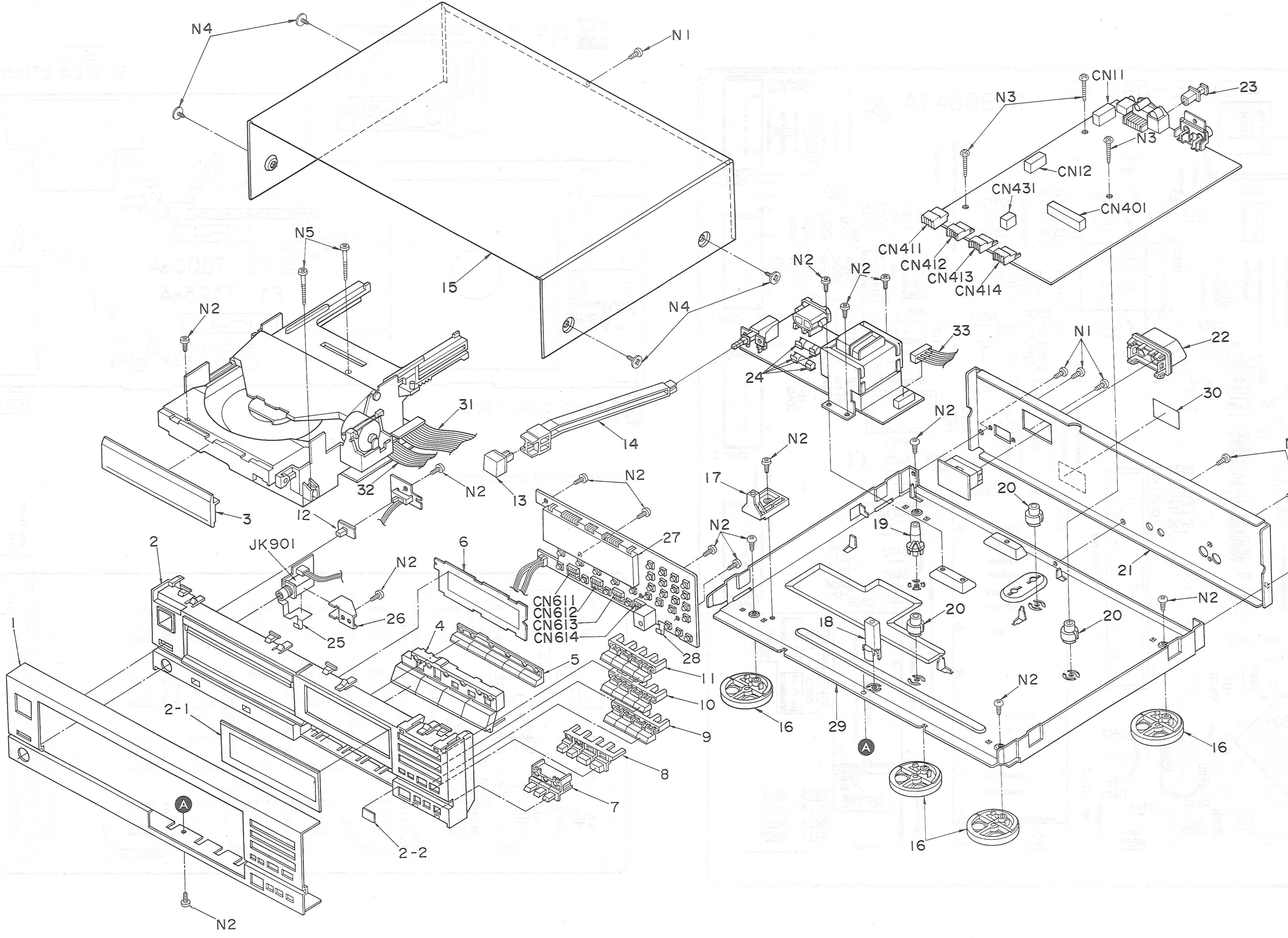
G POWER SUPPLY P.C.B.

- **Remote-control transmitter**

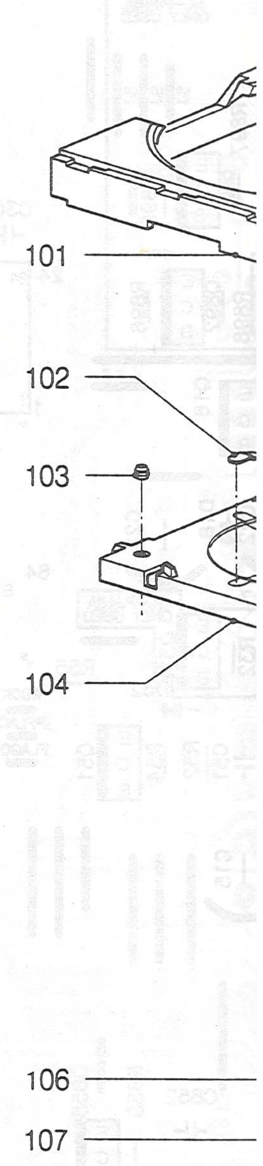

BATTERY 3V
IC1
D7 D6
Q1
D1
D3 D2
D5 D4
R1
C1 C2 C3
X
(▶PLAY/ ∥PAUSE)
(SKIP/SEARCH)
(4) (8) (RECALL) (REPEAT)
(3) (7) (PROGRAM) (TIME MODE)
(2) (6) (10) (0)
(■STOP) (EDIT/ TAPE LENGTH) (1) (5) (9) (+10)

■ EXPLODED VIEW

● Cabinet and chassis parts


1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
N4
N1
N3
CN11
23
CN12
N3
CN431
CN401
15
N5
N2
CN411
CN412
CN413
CN414
N2
N2
N4
33
N1
22
24
30
31
N2
14
N2
N1
32
N2
13
N2
17
20
N1
3
12
27
N2
19
2
JK901
6
N2
21
CN611
CN612
CN613
CN614
26
4
25
20
20
18
N2
1
28
5
11
10
N2
2-1
9
16
29
A
16
8
7
A
2-2
16
N2

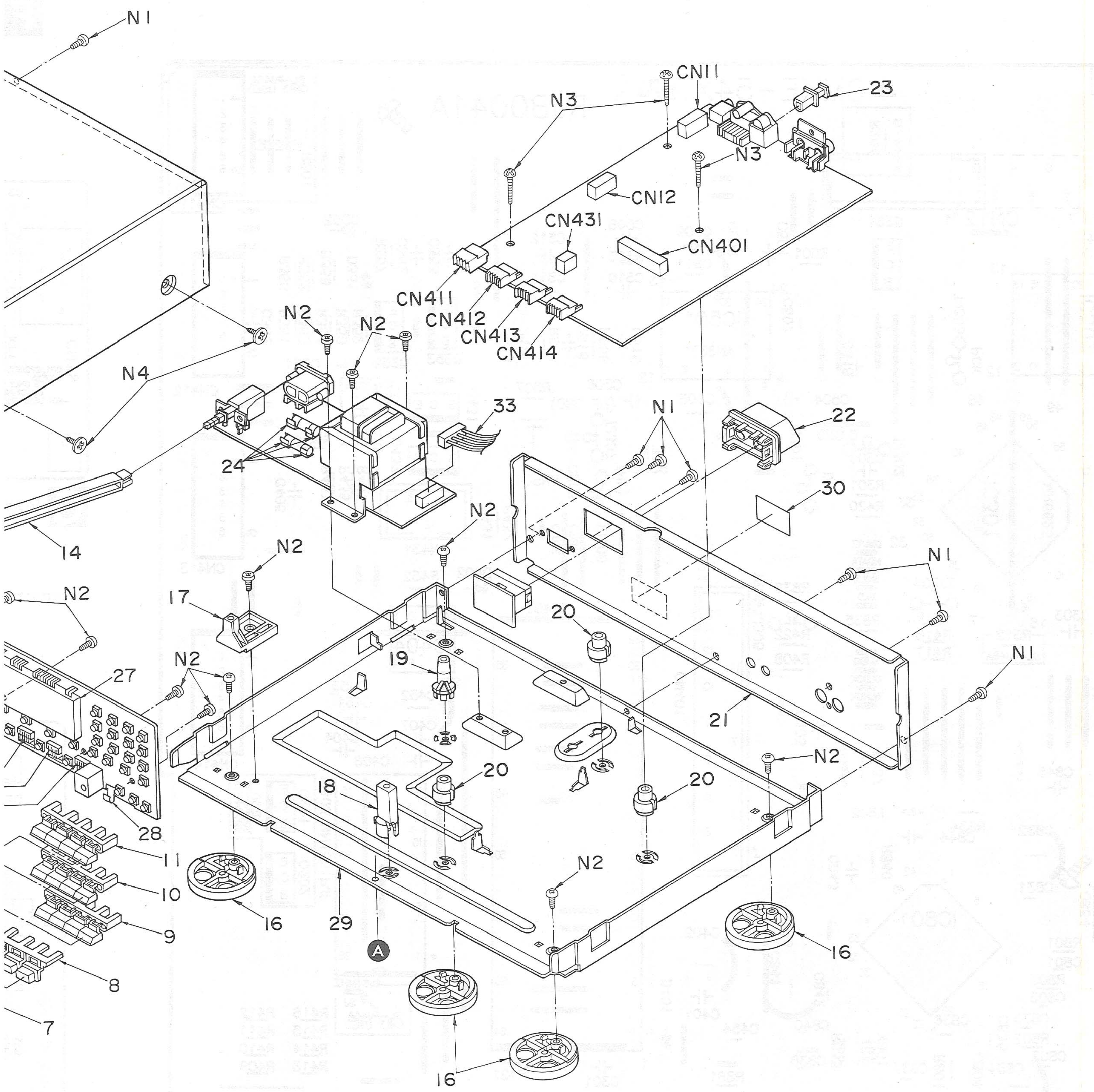
● Loading unit par


101
102
103
104
106
107

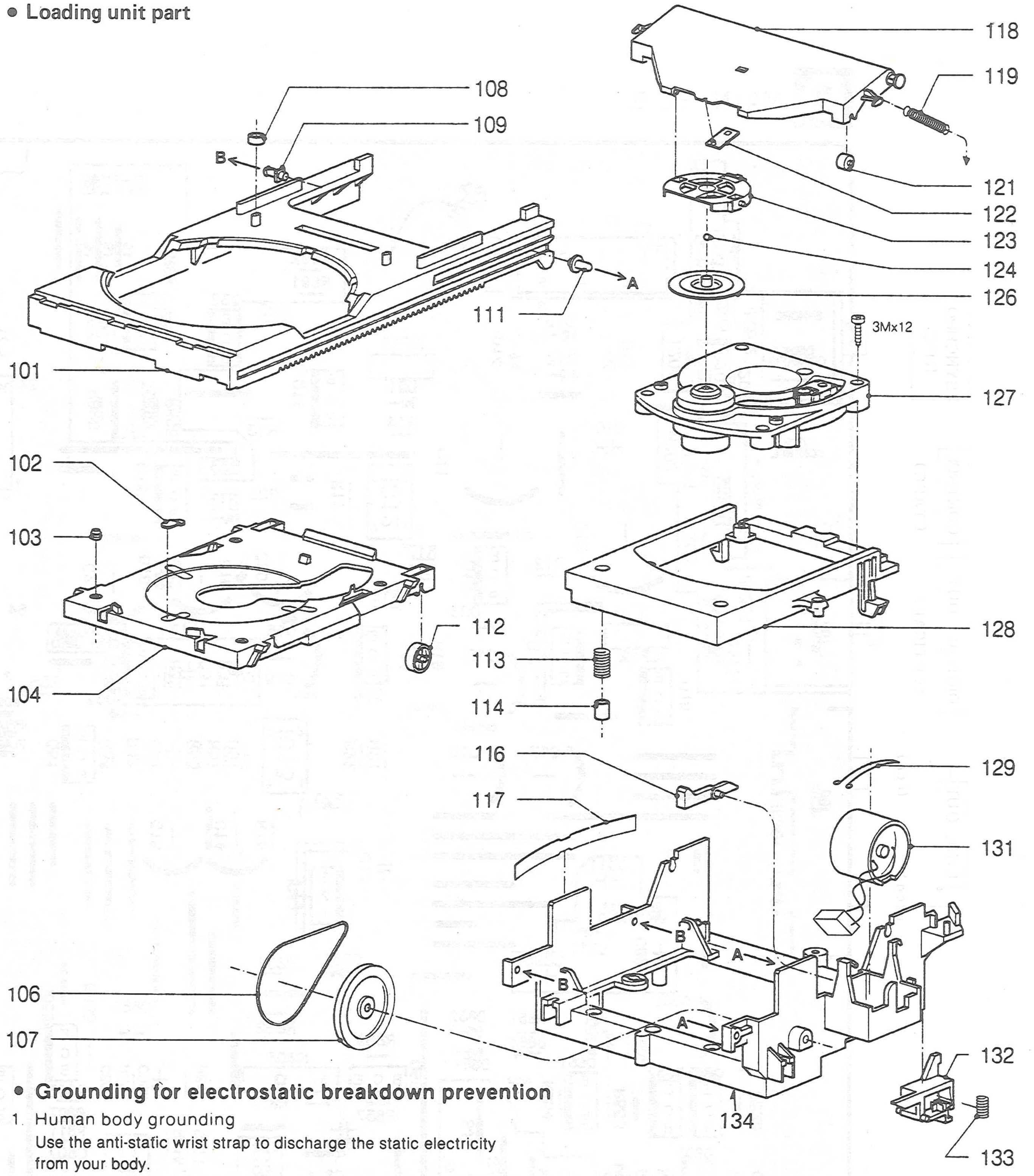
● **Grounding for**

1. Human body grou
   Use the anti-static w
   from your body.
2. Work table groun
   Put a conductive
   area where the op
   sheet.

Caution:
The static electricity
through the wrist s
clothes touch the op


N1
CN11
23
N3
N3
CN12
CN431
CN401
CN411
CN412
CN413
CN414
N2
N2
N4
33
N1
22
24
30
N2
14
N2
N1
N2
17
20
19
N1
27
N2
21
20
18
N2
20
28
11
10
16
29
9
N2
16
A
8
7
16

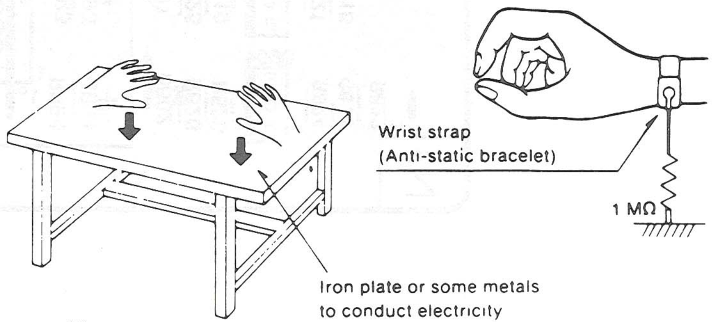
- **Loading unit part**


108
109
B
111
A
101
118
119
121
122
123
124
126
3Mx12
127
102
103
104
112
113
114
128
116
117
129
131
B
A
B
A
106
107
132
134
133

- **Grounding for electrostatic breakdown prevention**

1. Human body grounding
   Use the anti-static wrist strap to discharge the static electricity from your body.
2. Work table grounding
   Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

Caution:
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the optical pickup.


Wrist strap
(Anti-static bracelet)
1 MΩ
Iron plate or some metals to conduct electricity

■ REPLACEMENT PARTS LIST

Notes : ∗ Important safety notice :
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
∗ Bracketed indications in Ref. No. columns specify the area. (Refer to the first page for area.)
Parts without these indications can be used for all areas.
∗ Warning : This product uses a laser diode. Refer to caution statements on page 3.
∗ ACHTUNG :
Die lasereinheit nicht zerlegen.
Die lasereinheit darf nur gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.
∗ Remote control ass'y : Supply period for three years from termination of production.
∗ MB indicates parts that are supplied by MBV.

Ref. No.	Part No.	Part Name & Description	Remarks
		CABINET AND CHASSIS	
1	RGG0017	FRONT PANEL ASS'Y	
2	RGP0038	FRONT GRILLE ASS'Y	
2-1	RKW0012	ORNAMENT	
2-2	RKW0014	FILTER	
3	RGK0046	ORNAMENT	
4	RGU0057	BUTTON MAIN	
5	RGU0058	BUTTON SKIP	
6	RMR0087	ORNAMENT	
7	RGU0061	BUTTON LINK	
8	RGU0060	BUTTON EDIT	
9	RGU0059A	BUTTON NO. A	
10	RGU0059B	BUTTON NO. B	
11	RGU0059C	BUTTON NO. C	
12	SBD151	KNOB TIMER	
13	SBC666-1	KNOB POWER	
14	RMR0084	ROD MB	
15	RKM0015-K	CABINET BODY MB	
16	SKL307	FOOT	
17	RMR0022	HOLDER MB	
18	RMR0021	BRACKET MB	
19	RMR0020	BRACKET MB	
20	SHE185-2	BRACKET	
21	RGR0022	REAR PANEL ASS'Y MB	<E>
21	RGR0007A	REAR PANEL MB	<EG>
21	RGR0007B	REAR PANEL MB	<EB>
22	SJS9333A	AC OUT LET COVER	<E, EG>
22	SJS9332A	AC OUT LET COVER	<EB>
23	VJA1034	CAP	
24	SJT390	FUSE HOLDER	
25	SUWD139	BRACKET	
26	RHR0085	HOLDER MB	
27	SUSD165	SPRING	
28	SUSD144	EARTH PLATE	
29	RMK0023	BOTTOM BOARD MB	
30	SQWD7	CAUTION (LASER)	
31	REX0008	FLAT CABLE ASS'Y MB	
32	REX0007	FLAT CABLE ASS'Y MB	
33	REX0006	FLAT CABLE ASS'Y MB	
N1	XTBS3+8JFZ1	SCREW	
N2	XTB3+8JFZ	SCREW	
N3	XTB3+16JFZ	SCREW	
N4	SNE2129-1	SCREW	
N5	XTB3+35JFZ	SCREW	

Ref. No.	Part No.	Description
LOADING UNIT PARTS		
101	4822 444 50603	TRAY MB
102	4822 325 50176	GROMMET, CABLE MB
103	4822 325 50177	GROMMET, CABLE MB
104	4822 466 92251	PLATE MB
106	4822 358 10115	BELT, DRIVING MB
107	4822 522 32359	WHEEL, GEAR MB
108	4822 532 51518	RING, RUBBER MB
109	4822 402 61081	GUIDE MB
111	4822 402 61132	GUIDE MB
112	4822 528 90638	ROLLER MB
113	4822 492 51902	SPRING, COMPRES. MB
114	4822 466 61587	FOAM MB
116	4822 402 61107	LEVER MB
117	4822 492 63659	SPRING, BLADE MB
118	4822 444 60568	LID MB
119	4822 492 32883	SPRING, TENSION MB
121	4822 528 90639	ROLLER MB
122	4822 466 92257	PLATE MB
123	4822 402 61207	HOLDER MB
124	4822 520 40177	BALL MB
126	4822 530 80503	RING, PRESSURE MB
127	4822 691 30209	Optical pickup unit MB
128	4822 402 61196	SUPPORT MB
129	4822 492 63746	SPRING, CLAMPING MB
131	4822 361 20998	MOTOR MB
132	4822 402 50244	BRACKET MB
133	4822 492 51935	SPRING, COMPRES. MB
134	4822 464 50715	CHASSIS MB

Ref. No.	Part No.	Part Name & Description	Remarks
		INTEGRATED CIRCUITS	
IC11	LM2940T5	IC, REGULATOR	
IC12	BA4558FT1	IC, STABILIZER	
IC13	BA4558FT1	IC, RESET	
IC301	MN6625	IC, SIGNAL PROCESSING	
IC302	SVICXK5816M	IC, 16K RAM	
IC401	MN1554PJE-2	IC, SYSTEM CONTROL	
IC402	BA4558FT1	IC, MOTOR DRIVE	
IC403	MN1551PJF-1	IC, S CONTROL	
IC404	MN74HC00S	IC, NAND GATE	
IC501	AN8371S	IC, DATA SLICE&PLL	
IC601	MN15283PEM-2	IC, FL DRIVE&SIGNAL GENERATOR	
IC602	HC-MD10E	IC, REMOTE CONTROL	
IC603	MN1551PJM-1	IC, REMOTE CONTROL	
IC801	MN6471	IC, DF&DAC	
IC802	LM833M63	IC, COMPARATOR	
IC803	NJM4560M	IC, BUFFER	
IC805	SVIH8DN2175	IC, L. P. F	
IC806	SVIH8DN2175	IC, L. P. F	
IC891	NJM3414M	IC, BUFFER	
ICP1	SRUN38T	IC, PROTECTOR	<EB> ⚠
ICP2	SRUN38T	IC, PROTECTOR	<EB> ⚠
ICP11	SRUN15T	IC, PROTECTOR	⚠
ICP12	SRUN15T	IC, PROTECTOR	⚠
		TRANSISTORS	
Q11	2SD1266QR	TRANSISTOR	
Q12	2SB941QR	TRANSISTOR	
Q13	2SB1240QRTV6	TRANSISTOR	
Q14	2SD1862QRTV6	TRANSISTOR	
Q15	2SB1240QRTV6	TRANSISTOR	
Q16	2SB1238QSTV6	TRANSISTOR	
Q31	DTA124EST	TRANSISTOR	
Q32	DTC124EST	TRANSISTOR	
Q51	DTC124EST	TRANSISTOR	
Q201	DTC124EST	TRANSISTOR	
Q202	DTC124EST	TRANSISTOR	
Q351	DTA124EST	TRANSISTOR	
Q352	2SD1862QRTV6	TRANSISTOR	
Q353	2SB1240QRTV6	TRANSISTOR	
Q431	2SD1862QRTV6	TRANSISTOR	
Q432	2SB1240QRTV6	TRANSISTOR	
Q606	DTC124EST	TRANSISTOR	
Q607	DTC124EST	TRANSISTOR	
Q608	DTC124EST	TRANSISTOR	
Q609	DTC124EST	TRANSISTOR	
Q610	DTC124EST	TRANSISTOR	
Q611	DTC124EST	TRANSISTOR	
Q612	DTC124EST	TRANSISTOR	

Ref. No.	Part No.	Part Name & Description	Remarks
Q801	2SC3311QRSTA	TRANSISTOR	
Q802	2SC3311QRSTA	TRANSISTOR	
Q803	2SD1450RSTTA	TRANSISTOR	
Q804	2SD1450RSTTA	TRANSISTOR	
Q851	DTA124EST	TRANSISTOR	
Q852	DTC124EST	TRANSISTOR	
Q853	DTA114EST	TRANSISTOR	
Q854	DTC124EST	TRANSISTOR	
Q855	DTA124EST	TRANSISTOR	
Q891	2SD1450RSTTA	TRANSISTOR	
Q892	2SD1450RSTTA	TRANSISTOR	
		DIODES	
D11	SVDS5688GT3	DIODE	⚠
D12	SVDS5688GT3	DIODE	⚠
D13	SVDS5688GT3	DIODE	⚠
D14	SVDS5688GT3	DIODE	⚠
D15	SVDS5688GT3	DIODE	⚠
D16	SVDS5688GT3	DIODE	⚠
D17	SVDS5688GT3	DIODE	⚠
D18	SVDS5688GT3	DIODE	⚠
D19	MA4330MTA	DIODE	
D20	MA4062HTA	DIODE	
D21	MA4082MTA	DIODE	
D22	MA4062HTA	DIODE	
D23	SVDS5688GT3	DIODE	⚠
D31	1SS254TA	DIODE	
D51	MA4033MTA	DIODE	
D52	1SS254TA	DIODE	
D351	MA4051MTA	DIODE	
D352	MA4051MTA	DIODE	
D401	1SS254TA	DIODE	
D402	1SS254TA	DIODE	
D601	1SS254TA	DIODE	
D602	1SS254TA	DIODE	
D603	1SS254TA	DIODE	
D604	1SS254TA	DIODE	
D605	1SS254TA	DIODE	
D606	1SS254TA	DIODE	
D607	1SS254TA	DIODE	
D608	1SS254TA	DIODE	
D609	1SS254TA	DIODE	
D610	1SS254TA	DIODE	
D801	1SS254TA	DIODE	
D802	1SS254TA	DIODE	
D831	1SS254TA	DIODE	
D851	1SS254TA	DIODE	
D852	1SS254TA	DIODE	
D853	1SS254TA	DIODE	
D854	1SS254TA	DIODE	

Ref. No.	Part No.	Part Name & Description	Remarks
		VARIABLE RESISTORS	
VR501	EVND8AA02B13	V. RESISTOR, PLL ADJ	
		COILS	
L201	ELEV3R3KA	COIL	
L202	ELEV3R3KA	COIL	
L203	ELEV3R3KA	COIL	
L204	ELEV3R3KA	COIL	
L311	ELEPK1R0KA	COIL	
L832	ELEPK4R7KA	COIL	
L901	ELEV3R3KA	COIL	
L902	ELEV3R3KA	COIL	
L903	ELEV3R3KA	COIL	
		TRANSFORMERS	
T1	RTP1V4E001-J	TRANSFORMER MB	<E, EG> ⚠
T1	RTP1V4B002-J	POWER TRANSFORMER MB	<EB> ⚠
		OSCILLATORS	
X801	SVQ49U338S	OSCILLATOR	
		DISPLAY TUBE	
FL601	RSL0008F	DISPLAY TUBE	
		FUSES	
F1	XBA2C012TB0	FUSE (250V. T125ma)	⚠
F2	XBA2C08TB0	FUSE (250V. T800ma)	<E, EG> ⚠
		SWITCHS	
S1	ESB8249V	SW, POWER	⚠
S601	EVQQS705G	SW, OPEN/CLOSE	
S602	EVQQS705G	SW, STOP	
S603	EVQQS705G	SW, PAUSE	
S604	EVQQS705G	SW, PLAY	
S605	EVQQS705G	SW, PROGRAM	
S606	EVQQS705G	SW, CANCEL	
S607	EVQQS705G	SW, TIME MODE	
S608	EVQQS705G	SW, REPEAT	
S609	EVQQS705G	SW, RECALL	
S610	EVQQS705G	SW, R. SKIP/SEARCH	
S611	EVQQS705G	SW, F. SKIP/SEARCH	
S612	EVQQS705G	SW, SIDE A/B	
S613	EVQQS705G	SW, EDIT	
S614	EVQQS705G	SW, LINK	
S615	EVQQS705G	SW, WARP	
S616	EVQQS705G	SW, SCAN	
S617	EVQQS705G	SW, 1	
S618	EVQQS705G	SW, 2	
S619	EVQQS705G	SW, 3	
S620	EVQQS705G	SW, 4	
S621	EVQQS705G	SW, 5	
S622	EVQQS705G	SW, 6	
S623	EVQQS705G	SW, 7	
S624	EVQQS705G	SW, 8	
S625	EVQQS705G	SW, 9	
S626	EVQQS705G	SW, 10	
S627	EVQQS705G	SW, +10	
S628	EVQQS705G	SW, 0	
S651	RSS2A63ZA-H	SW, TIMER	
		CONNECTOR AND SOCKET	
BT601	REX0019	SOCKET	
BT603	REX0020	SOCKET	
CN1	RJT001H006	CONNECTOR MB	
CN11	RJT001H006	CONNECTOR MB	
CN12	RJT001H007	CONNECTOR MB	
CN401	RJT001H014	CONNECTOR MB	
CN411	SJS50680WL	SOCKET	
CN412	SJS50680WL	SOCKET	
CN413	SJS50680WL	SOCKET	
CN414	SJS50680WL	SOCKET	
CN431	RJT001H003	CONNECTOR MB	
CN611	SJT30647WL	CONNECTOR	
CN612	SJT30647WL	CONNECTOR	
CN613	SJT30647WL	CONNECTOR	
CN614	SJT30647WL	CONNECTOR	
		JACKS	
JK1	SJS9236	AC INLET	⚠
JK2	SJS9333B	AC OUTLET	<E, EG> ⚠
JK2	SJS9332B	AC OUTLET	<EB> ⚠
JK201	SJS402	DECK CONTROL	
JK202	SJJ130-1	SYNCRO	
JK301	TOTX174-A	OPTICAL OUTPUT	
JK801	SJFD4	OUTPUT TERMINAL	
JK901	SJJ146B	HEADPHONES	

Ref. No.	Part No.	Description	
INTEGRATED CIRCUITS			
IC6501	4822 209 73234	I.C, PHOTO DIODE SIGNAL PROCESSOR	MB
IC6503	4822 209 73235	I.C, RADIAL ERROR SIGNAL PROCESSOR	MB
IC6504	4822 209 72587	I.C, FOCUS/RADIAL DRIVE	MB
TRANSISTORS			
Q6502	4822 130 44121	TRANSISTOR	MB
Q6507	5322 130 42136	TRANSISTOR	MB

Ref. No.	Part No.	Description	
DIODES			
D6505	4822 130 81101	DIODE	MB
D6506	4822 130 81101	DIODE	MB
VARIABLE RESISTORS			
VR3520	4822 101 10685	V.R, LASER POWER ADJ.	MB
VR3569	4822 100 20522	V.R, FOCUS OFFSET ADJ.	MB
SWITCH			
S1001	4822 276 12523	SW, TRAY	MB

Ref. No.	Part No.	Part Name & Description	Remarks
		ACCESSORIES	
A1	RQT0050E	INSTRUCTION MANUAL MB	<E>
A1	RQT0050G	INSTRUCTION MANUAL MB	<E>
A1	RQT0050D	INSTRUCTION MANUAL MB	<EG>
A1	RQT0050B	INSTRUCTION MANUAL MB	<EB>
A3	SFDAC05E03	POWER CORD	<E, EG> ⚠
A3	SJA188	POWER CORD	<EB> ⚠
A4	SJPD16	OPTICAL OUTPUT CORD	
A5	SJP2249-3	OUTPUT CORD	
A6	SJP2257T	SYNCHRO REC CORD	
A6	RQLA0013	CAUTION (LOCK) MB	
A7	RQCA0002	CAUTION MB	

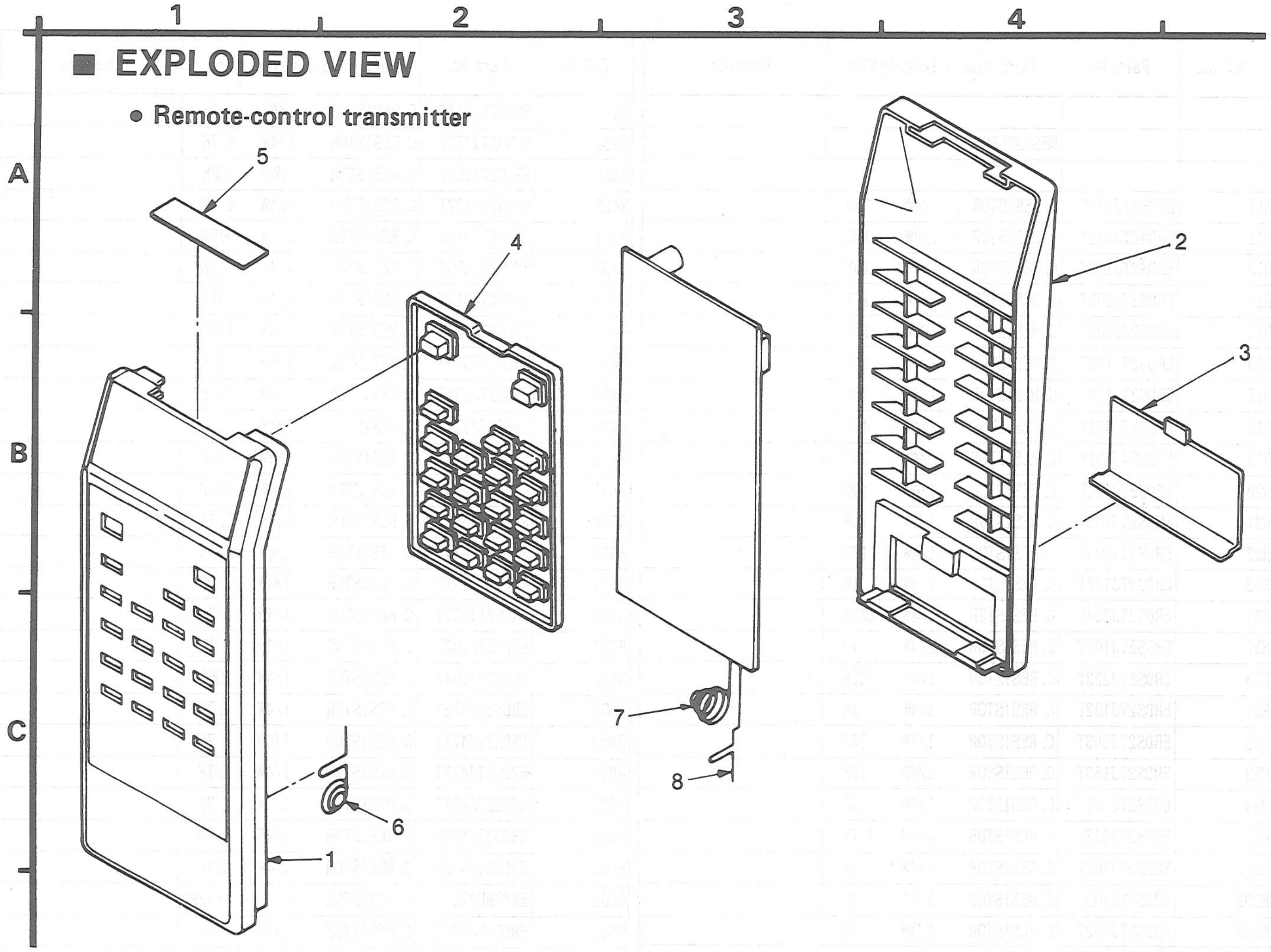
Ref. No.	Part No.	Part Name & Description	Remarks
		PACKING MATERIAL	
P1	RPG0048	CARTON BOX MB	
P2	RPN0073	PAD MB	
P3	XZB60X60A01	PROTECION BAG (UNIT)	
P4	XZB23X35C03	PROTECION BAG (F. B)	
P5	XZB23X20C03	PROTECION BAG (CORD)	
P6	XZB26X17C03	PROTECION BAG (CORD)	
P7	RMR0024	CLAMPER	
P8	RPH0026	SPACER MB	
		REMOTE CONTROL UNIT	
RC1	EUR64790	REMOTE CONTROL UNIT	

Ref. No.	Part No.	Description
REMOTE CONTROL		
INTEGRATED CIRCUITS		
IC1	MN6030B	IC, MICROCOMPUTER
TRANSISTORS		
Q1	UN1231	TRANSISTOR
DIODES		
D1	LN66-S	L.E.D
COIL		
D2, D3	MA154WK	DIODE
D4, D5	MA154WK	DIODE
D6, D7	MA154WA	DIODE
OSCILLATOR		
X1	CSB420PB1	OSCILLATOR

Ref. No.	Part No.	Description
RESISTORS		
R1	ERDS2TJ1R0	CARBON, 1Ω, 1/4W
CAPACITORS		
C1	ECKD1H471KB	CERAMIC, 470PF, 50V
C2	ECKD1H121KB	CERAMIC, 120PF, 50V
C3	ECEA0GK101	ELECTROLYTIC, 100μF, 4V
MECHANISM PARTS		
1	UR64VCS571	UPPER CABINET
2	UR64CS803A	LOWER CABINET
3	UR64EC804	BATTERY COVER
4	UR64CT811F	BUTTON
5	UR52SB327	PLATE
6	UR64TD374	BATTERY TERMINAL(COMMON)
7	UR64TD813	BATTERY TERMINAL(-)
8	UR64TD812	BATTERY TERMINAL(+)
REMOTE CONTROL ASS'Y		
RC1	EUR64790	REMOTE CONTROLLER

■ EXPLODED VIEW

- **Remote-control transmitter**



■ RESISTORS AND CAPACITORS

Notes : ＊Important safety notice :
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
＊Bracketed indications in Ref. No. columns specify the area. (Refer to the first page for area.)
Parts without these indications can be used for all areas.

Numbering System For Resistors

Example:

ERD	25	F	J	102
Type	Wattage (1/4W)	Shape	Tolerance	Value (1KΩ)

ERX	2	AN	J	471
Type	Wattage (2W)	Shape	Tolerance	Value (470Ω)

Numbering System For Capacitors

Example:

ECKD	1H	102	Z	F
Type	Voltage (50V)	Value (0.001μF)	Tolerance	Unique

ECEA	50	M	330
Type	Voltage (50V)	Characteristics	Value (33μF)

- Capacity values are in microfarads (μF) unless specified otherwise, P = Pico-farads (pF) F = Farads (F).
- Resistance values are in ohms (Ω), unless specified otherwise, 1K = 1,000Ω, 1M = 1,000kΩ

Resistor Type	Wattage		Tolerance
ERD : Carbon	10 : 1/8W	12 : 1/2W	J : ±5%
ERG : Metal Oxide	14 : 1/4W	25 : 1/4W	F : ±1%
ERQ : Fuse Type Metal	1A : 1W	18 : 1/8W	G : ±2%
ERX : Metal Film	S2 : 1/4W	S1 : 1/2W	J : ±5%
ERD L : Carbon (chip)	2F : 1/4W	50 : 1/2W	K : ±10%
ERO K : Metal Film (chip)	2A : 2W	3A : 3W	M : ±20%
ERC : Solid	6G : 1/10W	8G : 1/8W	
ERF : Incombustible Box-Shaped			
ERM : Wire-Wound			
RRJ : Chip Resistor			
ERJ : Chip Resistor			

Capacitor Type	Voltage		Tolerance
ECE : Electrolytic	0J : 6.3V	1A : 10V	K : ±10%
ECCD : Ceramic	1C : 16V	1E : 25V	M : ±20%
ECKD : Ceramic Capacitor	1H : 50V	1V : 35V	Z : $^{+80}_{-20}$ %
ECQM : Polyester	50 : 50V	05 : 50V	
ECQP : Polypropylene	2H : 500V	2A : 100V	J : ±5%
ECG : Ceramic	1 : 100V	1J : 63V	G : ±2%
ECEA N : Non Polar Electrolytic	KC : 400V AC		F : ±1%
QCU : Ceramic (Chip Type)	KC : 125V AC		C : ±0.25pF
ECUX : Ceramic (Chip Type)	(UL)		D : ±0.5pF
ECF : Semiconductor			
EECW : Liquid electrolyte double layer capacitor			

Ref. No.	Part No.	Part Name & Description	Remarks
		RESISTORS	
R11	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R12	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R13	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R14	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R15	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R16	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R17	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R18	ERDS2TJ471T	C. RESISTOR 1/4W 470	
R19	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R20	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R21	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R22	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R23	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R31	ERDS2TJ224T	C. RESISTOR 1/4W 220K	
R32	ERDS2TJ100T	C. RESISTOR 1/4W 10	
R33	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R51	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R52	ERDS2TJ393T	C. RESISTOR 1/4W 39K	
R53	ERDS2TJ153T	C. RESISTOR 1/4W 15K	
R54	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R55	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R201	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R202	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R203	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R204	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R205	ERDS2TJ100T	C. RESISTOR 1/4W 10	
R301	ERDS2TJ182T	C. RESISTOR 1/4W 1.8K	
R311	ERDS2TJ822T	C. RESISTOR 1/4W 8.2K	
R312	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R351	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R352	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R353	ERDS2TJ123T	C. RESISTOR 1/4W 12K	
R354	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R355	ERDS2TJ333T	C. RESISTOR 1/4W 33K	
R356	ERDS2TJ333T	C. RESISTOR 1/4W 33K	
R357	ERD25FVJ6R8T	C. RESISTOR 1/4W 6.8	⚠
R358	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R359	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R408	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R409	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R410	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R411	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R412	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R413	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R414	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R415	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R416	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R417	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R418	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R419	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R420	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R421	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R422	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R431	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R432	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R433	ERDS2TJ913T	C. RESISTOR 1/4W 91K	
R434	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R435	ERDS2TJ913T	C. RESISTOR 1/4W 91K	
R436	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R437	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R452	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R501	ERDS2TJ224T	C. RESISTOR 1/4W 220K	
R502	ERDS2TJ562T	C. RESISTOR 1/4W 5.6K	
R503	ERDS2TJ474T	C. RESISTOR 1/4W 470K	
R504	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R506	ERDS2TJ333T	C. RESISTOR 1/4W 33K	
R507	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R601	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R602	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R603	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R604	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R605	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R606	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R607	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R608	EXBZ9E472J	.RESISTOR 1/10W 4.7K(x8)	
R617	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R618	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R619	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R620	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R801	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R802	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R803	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R804	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R805	ERDS2TJ273T	C. RESISTOR 1/4W 27K	
R806	ERDS2TJ273T	C. RESISTOR 1/4W 27K	
R807	ERDS2TJ273T	C. RESISTOR 1/4W 27K	
R808	ERDS2TJ273T	C. RESISTOR 1/4W 27K	
R809	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R810	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R811	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R812	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R813	ERDS2TJ221T	C. RESISTOR 1/4W 220	
R814	ERDS2TJ221T	C. RESISTOR 1/4W 220	
R815	ERDS2TJ474T	C. RESISTOR 1/4W 470K	
R816	ERDS2TJ474T	C. RESISTOR 1/4W 470K	
R817	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R818	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R819	ERDS2TJ471T	C. RESISTOR 1/4W 470	
R820	ERDS2TJ471T	C. RESISTOR 1/4W 470	
R821	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R822	ERDS2TJ473T	C. RESISTOR 1/4W 47K	

Ref. No.	Part No.	Part Name & Description	Remarks
R823	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R824	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R825	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R826	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R831	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R832	ERDS2TJ331T	C. RESISTOR 1/4W 330	
R833	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R834	ERDS2TJ561T	C. RESISTOR 1/4W 560	
R835	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R836	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R837	ERDS2TJ100T	C. RESISTOR 1/4W 10	
R838	ERDS2TJ100T	C. RESISTOR 1/4W 10	
R839	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R840	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R851	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R852	ERDS2TJ471T	C. RESISTOR 1/4W 470	
R853	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R854	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R855	ERDS2TJ183T	C. RESISTOR 1/4W 18K	
R856	ERDS2TJ333T	C. RESISTOR 1/4W 33K	
R857	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R858	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R859	ERDS2TJ105T	C. RESISTOR 1/4W 1M	
R860	ERDS2TJ105T	C. RESISTOR 1/4W 1M	
R861	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R891	ERDS2TJ560T	C. RESISTOR 1/4W 56	
R892	ERDS2TJ560T	C. RESISTOR 1/4W 56	
R893	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R894	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R895	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R896	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R897	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R898	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
		CAPACITORS	
C1	ECKDKC103PF2	. CAPACITOR 125V 0.01U	⚠
C2	ECFR1H103KB	S. CAPACITOR 50V 0.01U	⚠
C3	ECFR1H103KB	S. CAPACITOR 50V 0.01U	⚠
C10	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C11	ECEA1CU222E	E. CAPACITOR 16V 2200U	
C12	ECEA1CU222E	E. CAPACITOR 16V 2200U	
C13	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C14	ECEA0JK470B	E. CAPACITOR 6.3V 47U	
C15	ECEA0JK470B	E. CAPACITOR 6.3V 47U	
C16	ECEA1AK101B	E. CAPACITOR 10V 100U	
C17	ECEA1AK101B	E. CAPACITOR 10V 100U	
C18	ECEA1CU221B	E. CAPACITOR 16V 220U	
C19	ECEA1CU331B	E. CAPACITOR 16V 330U	
C20	ECEA1CU331B	E. CAPACITOR 16V 330U	
C21	ECEA1VU101B	E. CAPACITOR 35V 100U	
C22	ECEA1VU101B	E. CAPACITOR 35V 100U	
C31	ECEA1CKN100B	E. CAPACITOR 16V 10U	
C51	ECEA1HKN010B	E. CAPACITOR 50V 1U	
C201	ECBT1C103NS5	. CAPACITOR 16V 0.01U	
C202	ECBT1C103NS5	. CAPACITOR 16V 0.01U	
C301	ECBT1C103NS5	. CAPACITOR 16V 0.01U	
C302	ECBT1C103NS5	. CAPACITOR 16V 0.01U	
C303	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C304	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C306	ECBT1H270J5	. CAPACITOR 50V 27P	
C311	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C351	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C352	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C353	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C401	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C402	ECEA0JK470B	E. CAPACITOR 6.3V 47U	
C403	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C404	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C405	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C406	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C407	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C451	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C452	ECEA0JK470B	E. CAPACITOR 6.3V 47U	
C453	ECFR1H223KB	S. CAPACITOR 50V 0.022U	
C454	ECBT1H6R8K5	. CAPACITOR 50V 6.8P	
C501	ECQM1H104KF3	P. CAPACITOR 50V 0.1U	
C502	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C503	ECEA1CK100B	E. CAPACITOR 16V 10U	
C504	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C505	ECFR1E104ZF5	S. CAPACITOR 25V 0.1U	
C506	ECBT1H150JC5	. CAPACITOR 50V 15P	
C507	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C508	ECEA1CKN100B	E. CAPACITOR 16V 10U	
C509	ECBT1H470J5	. CAPACITOR 50V 47P	
C510	ECQM1H104KF3	P. CAPACITOR 50V 0.1U	
C511	ECEA1HKAR47B	E. CAPACITOR 50V 47U	
C512	ECBT1H681KB5	. CAPACITOR 50V 680P	
C513	ECBT1H681KB5	. CAPACITOR 50V 680P	
C514	ECQV1H474JZ3	P. CAPACITOR 50V 0.47U	
C515	ECQM1H153KF3	P. CAPACITOR 50V 0.015U	
C516	ECEA1VKN2R2B	E. CAPACITOR 35V 2.2U	
C518	ECBT1H561KB5	. CAPACITOR 50V 560P	
C601	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C602	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C603	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C604	ECBT1H102KB5	. CAPACITOR 50V 0.001U	
C801	ECBT1H680J5	. CAPACITOR 50V 68P	
C802	ECBT1H680J5	. CAPACITOR 50V 68P	
C803	ECBT1H680J5	. CAPACITOR 50V 68P	
C804	ECBT1H680J5	. CAPACITOR 50V 68P	
C805	ECBT1H470J5	. CAPACITOR 50V 47P	
C806	ECBT1H470J5	. CAPACITOR 50V 47P	
C807	ECBT1H470J5	. CAPACITOR 50V 47P	

Ref. No.	Part No.	Part Name & Description			Remarks
C808	ECBT1H470J5	. CAPACITOR	50V	47P	
C809	ECEA1EKN3R3B	E. CAPACITOR	25V	3. 3U	
C810	ECEA1EKN3R3B	E. CAPACITOR	25V	3. 3U	
C811	ECBT1H102KB5	. CAPACITOR	50V	0. 001U	
C812	ECBT1H102KB5	. CAPACITOR	50V	0. 001U	
C813	ECEA1CKN220B	E. CAPACITOR	16V	22U	
C814	ECEA1CKN220B	E. CAPACITOR	16V	22U	
C815	ECBT1H102KB5	. CAPACITOR	50V	0. 001U	
C816	ECBT1H102KB5	. CAPACITOR	50V	0. 001U	
C831	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C832	ECEA0JU331B	E. CAPACITOR	6. 3V	330U	
C833	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C834	ECEA0JU331B	E. CAPACITOR	6. 3V	330U	
C835	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C836	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C837	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	

Ref. No.	Part No.	Part Name & Description			Remarks
C838	ECBT1H5R6K5	. CAPACITOR	50V	5. 6P	
C840	ECBT1H5R6K5	. CAPACITOR	50V	5. 6P	
C841	ECEA0JK101B	E. CAPACITOR	6. 3V	100U	
C842	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C843	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C844	ECBT1H270J5	. CAPACITOR	50V	27P	
C845	ECFR1E104ZF5	S. CAPACITOR	25V	0. 1U	
C851	ECEA0JU471B	E. CAPACITOR	6. 3V	470U	
C852	ECEA1CKN100B	E. CAPACITOR	16V	10U	
C893	ECEA1CKN220B	E. CAPACITOR	16V	22U	
C894	ECEA1CKN220B	E. CAPACITOR	16V	22U	
C895	ECEA0JN101SB	E. CAPACITOR	6. 3V	100U	
C896	ECEA0JN101SB	E. CAPACITOR	6. 3V	100U	
C901	ECBT1C103NS5	. CAPACITOR	16V	0. 01U	
C902	ECBT1C103NS5	. CAPACITOR	16V	0. 01U	
C903	ECBT1C103NS5	. CAPACITOR	16V	0. 01U	

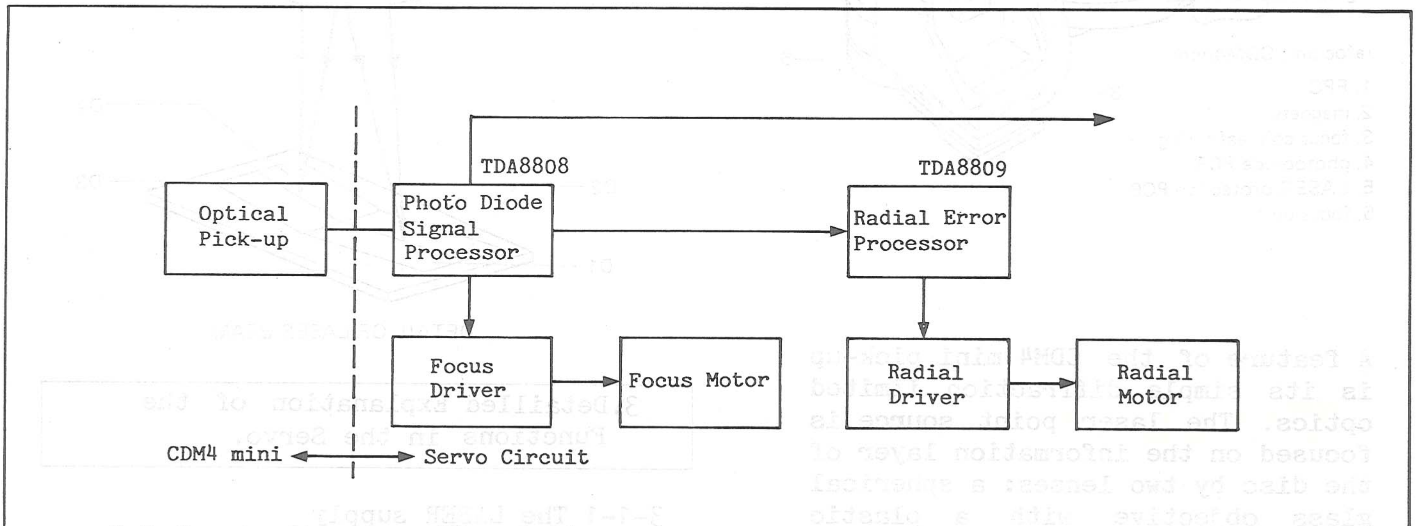
Ref. No.	Part No.	Value.		
RESISTORS				
R3501	4822 116 52426	4K7	1/2	MB
R3502	4822 111 90214	100K	1/8	MB
R3503	4822 111 30499	4E7	1/3	MB
R3504	4822 111 30499	4E7	1/3	MB
R3505	4822 111 90253	12K	1/8	MB
R3506	5322 111 90091	100	1/8	MB
R3507	4822 111 90248	2K2	1/8	MB
R3508	4822 111 90512	24K	1/8	MB
R3509	4822 111 90572	5K6	1/8	MB
R3510	4822 111 90249	10K	1/8	MB
R3521	4822 111 90178	220	1/8	MB
R3522	4822 111 30515	18	1/3	MB
R3523	4822 111 30511	12	1/3	MB
R3524	5322 111 90091	100	1/8	MB
R3530	4822 111 90543	47K	1/8	MB
R3531	4822 111 90344	15K	1/8	MB
R3533	5322 111 90268	5K1	1/8	MB
R3534	4822 111 90197	220K	1/8	MB
R3535	4822 116 53081	12K	3/5	MB
R3540	4822 116 52858	4E7	3/5	MB
R3541	4822 111 90544	6K8	1/8	MB
R3542	4822 111 90124	82	1/8	MB
R3543	4822 111 90544	6K8	1/8	MB
R3544	4822 111 30483	1	1/3	MB
R3545	4822 111 30483	1	1/3	MB
R3550	4822 111 90248	2K2	1/8	MB
R3551	4822 116 90417	15K	1/8	MB
R3552	4822 111 90171	820	1/8	MB
R3554	4822 116 90421	2K	1/8	MB
R3555	4822 111 90251	22K	1/8	MB
R3560	4822 111 91494	11K	1/8	MB
R3561	4822 116 90417	150K	1/8	MB
R3562	4822 116 52845	120K	3/5	MB
R3563	4822 111 90573	56K	1/8	MB
R3564	4822 111 91495	160K	1/8	MB
R3565	4822 116 52354	27	1/2	MB
R3566	4822 111 90186	22	1/8	MB
R3567	4822 116 52478	82K	1/2	MB
R3568	4822 111 90161	470K	1/8	MB
R3801	4822 111 90163	0E		MB
R3802	4822 111 90163	0E		MB
CAPACITORS				
C2501	4822 122 33147	0.022	50	MB
C2502	4822 124 22027	47	10	MB
C2503	4822 122 33147	0.022	50	MB
C2504	4822 122 31727	470P	63	MB
C2505	4822 124 22027	47	25	MB
C2506	4822 122 33104	100NF	63	MB
C2507	4822 122 31644	0.0022	63	MB
C2508	5322 121 42491	0.047	100	MB
C2509	4822 122 31772	47P	50	MB
C2510	4822 122 32442	0.01	50	MB
C2511	4822 122 31746	0.001	50	MB
C2513	4822 121 42245	0.22	63	MB
C2514	4822 121 51252	0.47	100	MB
C2515	4822 122 31746	0.001	50	MB
C2520	4822 122 31965	220P	63	MB
C2521	4822 124 22027	47	2.5	MB
C2530	4822 121 51321	0.0082	63	MB
C2531	4822 121 51321	0.0082	63	MB
C2532	4822 124 40272	33	16	MB
C2534	5322 121 42661	0.33	63	MB
C2535	5322 122 31848	0.033	63	MB
C2536	5322 122 31848	0.033	63	MB
C2537	4822 121 42245	0.22	63	MB
C2538	4822 121 42245	0.22	63	MB
C2540	4822 124 41583	0.68	50	MB
C2541	4822 122 33147	0.022	50	MB
C2542	4822 122 33147	0.022	50	MB
C2543	4822 124 40196	220	16	MB
C2544	4822 124 40196	220µ	16	MB
C2545	4822 122 33104	0.1	63	MB
C2546	4822 122 33104	0.1	63	MB
C2547	4822 122 33147	0.022	50	MB
C2550	4822 121 51049	0.015	63	MB
C2551	4822 121 51225	18NF	63	MB
C2560	4822 122 31784	0.0047	50	MB
C2561	4822 121 51252	0.047	100	MB
C2562	5322 121 42661	0.033	63	MB
C2563	4822 122 33104	100NF	63	MB
C2565	4822 122 32808	0.0012	50	MB

■ TECHNICAL INFORMATION

Explanation on the CDM4 mini system and servo circuit for service engineers

1. System Configuration

1-1. Block Diagram Rough


TDA8808
TDA8809
Optical Pick-up
Photo Diode Signal Processor
Radial Error Processor
Focus Driver
Focus Motor
Radial Driver
Radial Motor
CDM4 mini
Servo Circuit

* Refer to the page 18 and 19.

2. Rough Explanation of the Functions of the CDM4 mini System Part.

2-1. Servo electronics CDM4 mini system.

TDA8808: bipolar photo diode signal processor

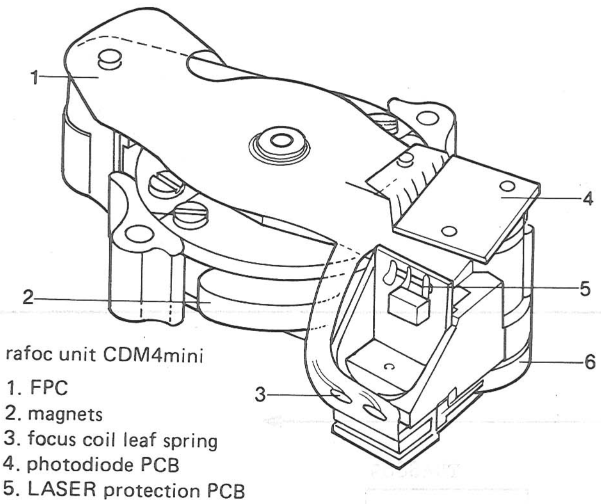
- Photodiode signal preamplifiers with separate h.f. and d.c. a.g.c. for optimum generation of the h.f. data signal and the focusing/tracking error signals.
- Tracking error signal amplifier.
- Focus error signal processor with focus normalizing and start-up circuit.
- Data equalizer.

  h.f. level and track-loss detectors.
- Regulated supply for the reading laser diode.
- Low current consumption: 15mA (8V -14V).

TDA8809: bipolar radial error processor

- Tracking error processor with automatic asymmetry control.
- a.g.c. circuitry with automatic start-up wobble generator.
- Tracking control for fast forward/reverse scan, search, repeat and pause functions.
- Low current consumption: 10mA (8V - 14V).

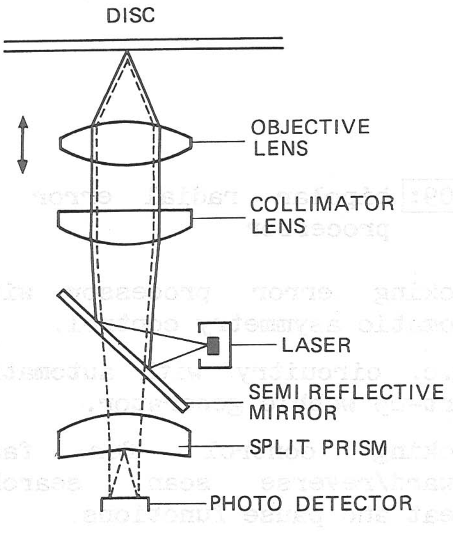
2-2.CDM4 mini Optical Pick-up



rafoc unit CDM4mini

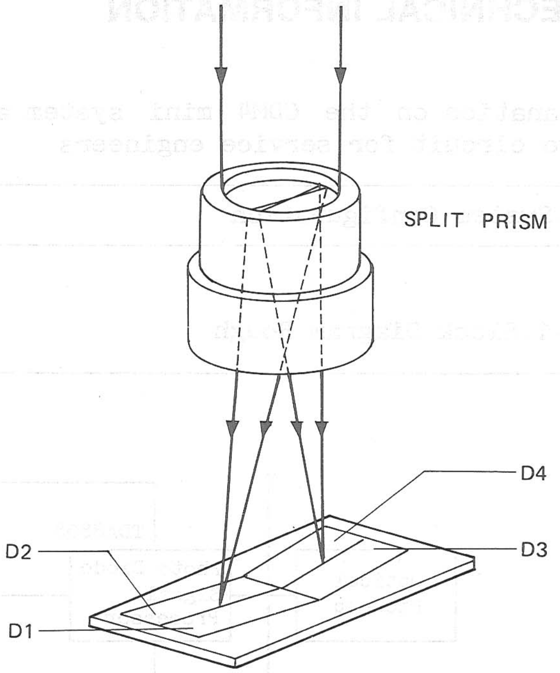
1. FPC
2. magnets
3. focus coil leaf spring
4. photodiode PCB
5. LASER protection PCB
6. focus unit

A feature of the CDM4 mini pick-up is its simple diffraction limited optics. The laser point source is focused on the information layer of the disc by two lenses: a spherical glass objective with a plastic aspherical skin, and a spherical glass collimator.


DISC
OBJECTIVE LENS
COLLIMATOR LENS
LASER
SEMI REFLECTIVE MIRROR
SPLIT PRISM
PHOTO DETECTOR

CDM4 Mini

Furthermore, a semi-transparent mirror is used instead of a beam-splitter cube. Astigmatism introduced into the reflected beam by the mirror is corrected by a plastic component (the wedge) which also dissects the beam into the two halves from which the tracking and focus error signals are generated.

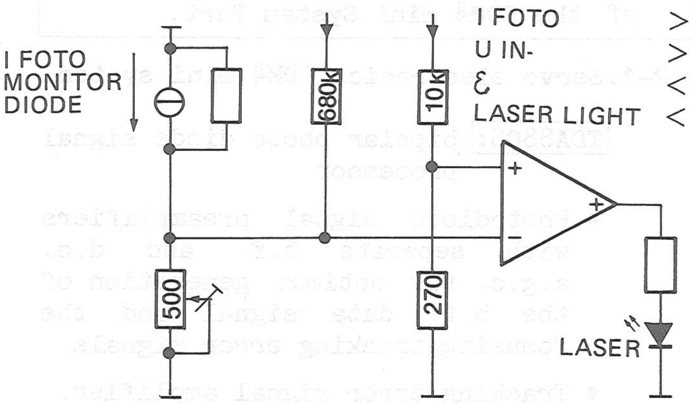

SPLIT PRISM
D4
D3
D2
D1

DETAIL OF LASER BEAM

3.Detailled Explanation of the Functions in the Servo.

3-1-1 The LASER supply

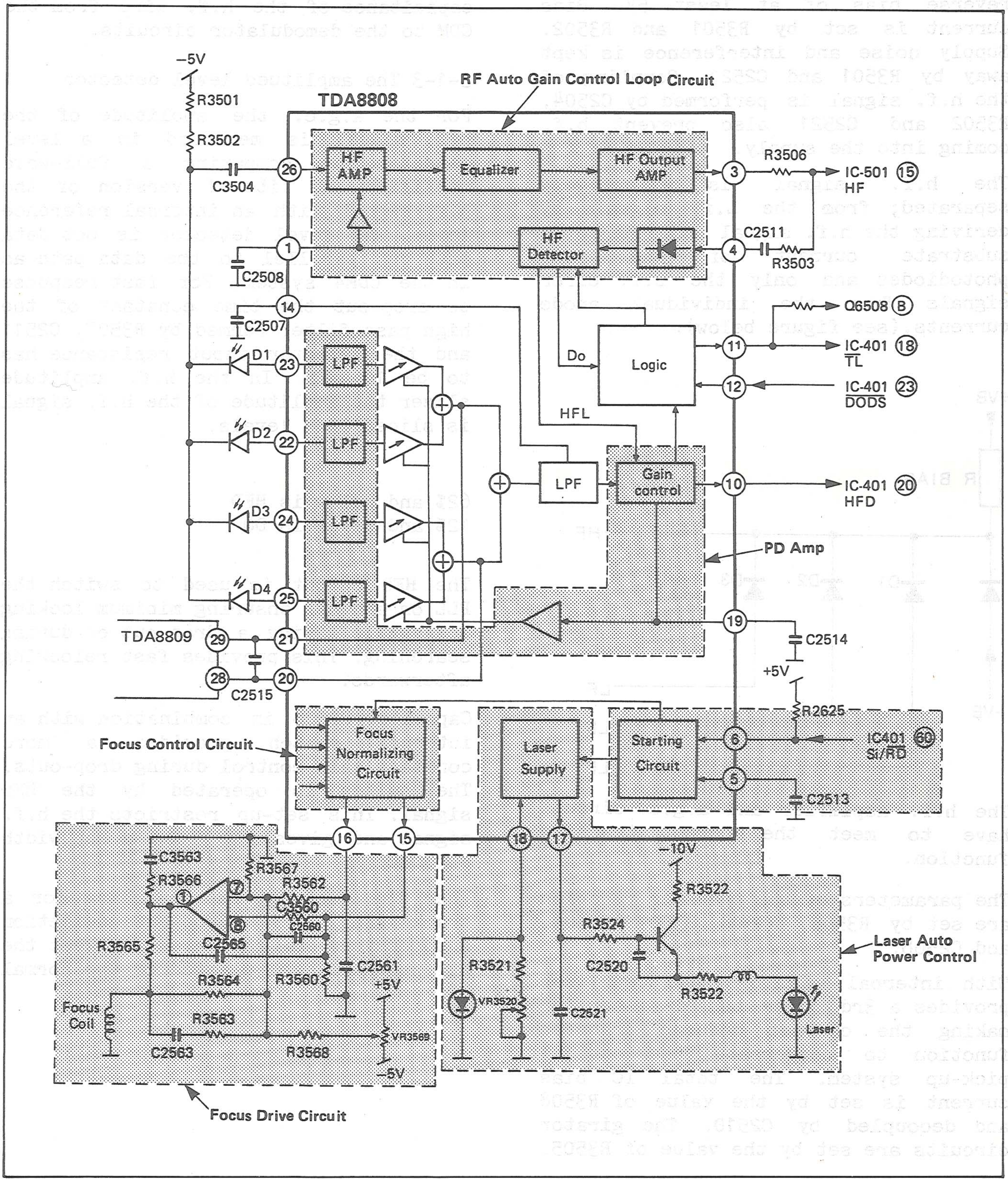
The LASER supply circuit has a working principle like the basic schematic below.


I FOTO
U IN-
ε
LASER LIGHT
I FOTO
MONITOR
DIODE
680k
10k
500
270
+
-
LASER

The LASER supply function integrated in the TDA8808 has as an extra an overload protection and a turn on transient protection. The LASER current is regulated by sensing the monitor photodiode current.

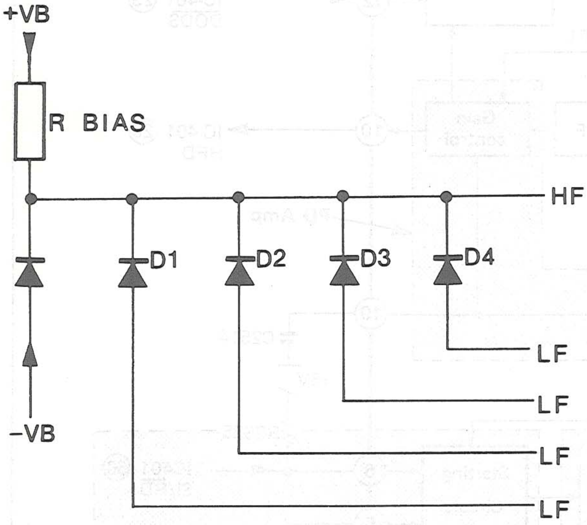
The threshold voltage of the LASER diode is approximately 1.75V and the sense voltage is approx. 200mV. It is not allowed to measure the sense voltage. A distortion at this end of the loop might cause severe damage to the LASER diode.

3-1-2 h.f. Signal handling, h.f. a.g.c. and data qeualizer.


-5V
R3501
R3502
C3504
TDA8808
RF Auto Gain Control Loop Circuit
26
HF AMP
Equalizer
HF Output AMP
3
R3506
IC-501 ⑮
HF
1
C2508
HF Detector
4
C2511
R3503
14
C2507
Q6508 Ⓑ
Logic
Do
11
IC-401 ⑱
TL
12
IC-401 ㉓
DODS
HFL
D1
23
LPF
D2
22
LPF
D3
24
LPF
D4
25
LPF
LPF
Gain control
10
IC-401 ⑳
HFD
PD Amp
19
C2514
TDA8809
29
21
28
20
C2515
+5V
R2625
Focus Control Circuit
Focus Normalizing Circuit
Laser Supply
Starting Circuit
6
IC401 ㊵
Si/RD
5
C2513
16
15
18
17
-10V
R3522
C3563
R3567
R3566
①
⑦
R3562
C3560
C2560
⑧
C2565
R3565
C2561
R3564
R3560
+5V
Focus Coil
R3563
VR3569
C2563
R3568
-5V
Focus Drive Circuit
R3524
C2520
Laser Auto Power Control
R3521
VR3520
C2521
R3522
Laser

The photodiodes used in the optical pick-up are connected in reverse direction. The photodiodes require a reverse bias of at least 5V. Bias current is set by R3501 and R3502. Supply noise and interference is kept away by R3501 and C2521. Coupling of the h.f. signal is performed by C2504, R3502 and C2521 also prevent h.f. coming into the supply.

The h.f. signal is effectively separated; from the L.f. signals by deriving the h.f. signal from the total substrate current of the four photodiodes and only the L.f. error signals from the individual anode currents.(see figure below).



The h.f. amplifier and a.g.c. circuit have to meet the correct transfer function.

The parameters of the transfer function are set by R3505, R3508, R3507, C2509, and C2508.

With internal girators the qealizer provides a 3rd order bessel filter for making the correct modular transfer function to compensate the optical pick-up system. The total IC bias current is set by the value of R3508 and decoupled by C2510. The girator circuits are set by the value of R3505.

The 3rd pole of the modular transfer function is made by the RC circuit containing R3507, C2511 and the capacitance of the h.f. wire from the CDM to the demodulator circuits.

3-1-3 The amplitued level detector

For the a.g.c. the amplitude of the h.f. signal is measured in a level detector by comparing a full-wave rectified and fitered version of the h.f. signal with an internal reference level. The level detector is not data path but parallel to the data path as in the CDM4 system. For fast response to drop-out the time constant of the high pass filter formed by R3507, C2511 and the detector input resistance has to be 10 sec. In the h.f. amplitude slicer the amplitude of the h.f. signal is sliced in 3 levels.

62% and below is HFD
12% and below is DO

The HFD output is used to switch the PLL on and off ensuring minimum locking loss while having a drop-out or during searching. This provides fast relocking afterwards.

Capacitor C2508 in combination with an internal switch provides a more constant gain control during drop-outs. The switch is operated by the HFD signal. This set-up restricts the h.f. signal and gives the loop a bandwidth of 50Hz.

When the pick-up is searching for a track the DODS (drop-out detection suppression) is activated to keep the h.f. signal level clamped on the normal

3-1-4 The photodiode current amplifiers and L.f. a.g.c.

The low pass filters for the photodiode inputs D1 - D4 are integrated in the photodiode signal processor.

The outputs for RE1 (RE1 = D1 + D2) and RE2 (RE2 = D3 + D4) are open collector outputs. In case an external pull-up has to be connected, it has to be connected to Vdd.

Normally the pull-up function is done by the inputs of the radial error processor.

The a.g.c. for the photodiode amplifiers keeps the d.c. sum current constant for all discs. The control loop has a LPF which is set by the value of C2507.

3-1-5 The track loss detector

During playback of a disc, the radial error signals keep the pick-up on track. In case of searching for a certain spot of music, the pick-up has to jump over the tracks. To maintain the control of the pick-up during a search operation, the microprocessor must be informed whether the pick-up is on track or off track. This function is performed by the track-loss detector.

Condition to be met for the track-loss:

- The gain controlled h.f. signal has to be between 12% and 62% of the nominal value (100% is set by the h.f. a.g.c.).
- Average light intensity of the I.f. signal is more than 120% of the nominal value (100% is set by the L.f.a.g.c.).

All values are set during track following.

Use of the TL signal:

1. Counting tracks when track jumping.
2. In case a TL is detected during normal playback the control microprocessor looks to the RE dig signal from the radial error processor and compensates the tracking error by means of the DAC signal.

Such a situation can only occur due to large knocks. This set up makes the system extremely tolerant for bumps.

(Formula TL=FS>120% and 63%>HFL>12%).

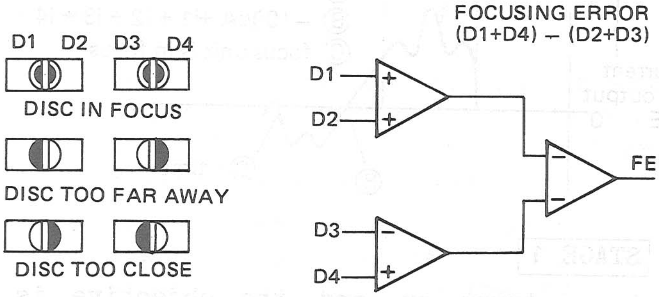
3-1-6 Focus processing

The CDM4 pick-up uses two focuault knife focus pick-ups to keep the reading spot focused on the data layer of the disc.

The TDA8808 has two focus outputs: FE and FE lag.

FE lag is the basic focus error signal. FE is a normalized version of FE to remove the effect of the unequal illumination of photodiode pairs D1, D2 and D3, D4 which occurs in case of tracking errors.

PRINCIPLE



FE lag= (I1 + I4)-(I2 + I3).Ftransfer

$$FE = \frac{I1 - I2}{I1 + I2} + \frac{I4 - I3}{I4 + I3} \cdot \quad I\ control$$

Since in focus $I1 + I2 \approx I3 + I4$

and $I1 \approx I2 \approx I3 \approx I4$ with a.g.c. on

FE = FE lag on trace

Either one signal or both signals can be used to control the focus actuator. The FE lag signal gives the loop the correct gain and phase margin. The FE signal has an important role in the start-up procedure.

The processing formula produced by the radial error processor is $RE = k\,d\,(i1+i2+i3+i4) - k(i1+i2)$.

The factors k and d are detected from the loop itself by processing a low frequency wobble fault signal, which is injected into the loop. Injection of this causes a displacement of +/- 0.05 µm of the arm.
The k is again factor and has to compensate:

- The tracking angle fault (varies between 90 degrees, smallest radius, and 45 degrees, largest radius).
- The pit geometry of disc (causing the amplitude of radial error signals to vary up to 100% from disc to disc).
- Deterioration of the laserdiode.

3-2-2 Automatic gain control (k-factor)

Detection of the desired value is done by detecting the phase angle of an injected wobble signal in the radial loop.

The closed loop transfer function has a phase shift of 135 degrees at 650 Hz (the wobble frequency).

To maintain the loop gain, the phase of the closed loop signal of RE is compared with a -45 degrees shifted signal derived from the 650 Hz wobble injection oscillator. If the gain is nominal the output of this phase comparator is zero. In other cases a positive or negative phase error signal is detected.
The detected signal is integrated by C2538. The value of this integrated signal sets the gain. This completes the set up for the k factor in TDA8809.

Note: The phase comparator is a linear multiplier which ensures that the a.g.c. loop is unaffected by spurious signals near the odd harmonics of the wobble frequency.

The open-loop gain control is clamped to an internal reference level during starting-up and searching.

3-2-3 Automatic asymmetry control (d-factor)

The radial error signal in a single-beam pick-up is derived from a comparison of the light intensity in each pupil half.

Errors in this signal can be caused by:

- Asymmetry in the far-field pattern of the laser.
- Light path to the disc.
- Imperfections in the beam splitter.

Errors can be corrected by bringing the d-factor in the total transfer function.

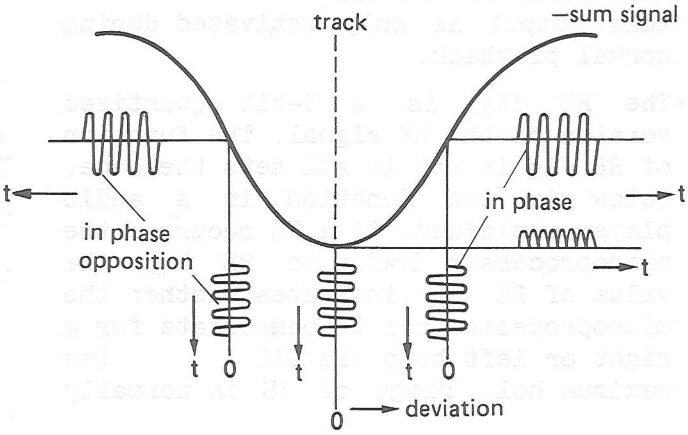
The wobble used to measure the k-factor is also used to measure the asymmetry. The signal causes the beam to wobble with an amplitude of 0.05 um. When the reading spot is to the right of the track the total amount of L.F.light (iTOT = i1+i2+i3+i4 = RE1 + RE2) is in phase with the wobble in the radial error signal.

When the reading spot is to the left the I.f. sum signal (RE1 + RE2) is 180 degrees out of phase with the wobble.

The sum signal is in practice multiplied by a 90 degrees shifted version of the wobble signal. The multiplier is again linear giving the above-mentioned benefits. The loop has a filter which is set by the value of C2537.

The imperfections mentioned above make the beam follow the track at one of its edges. The wobble component in the RE signal for such a situation is visualised below.

Note: C2537 is the capacitor which integrates the d-factor.

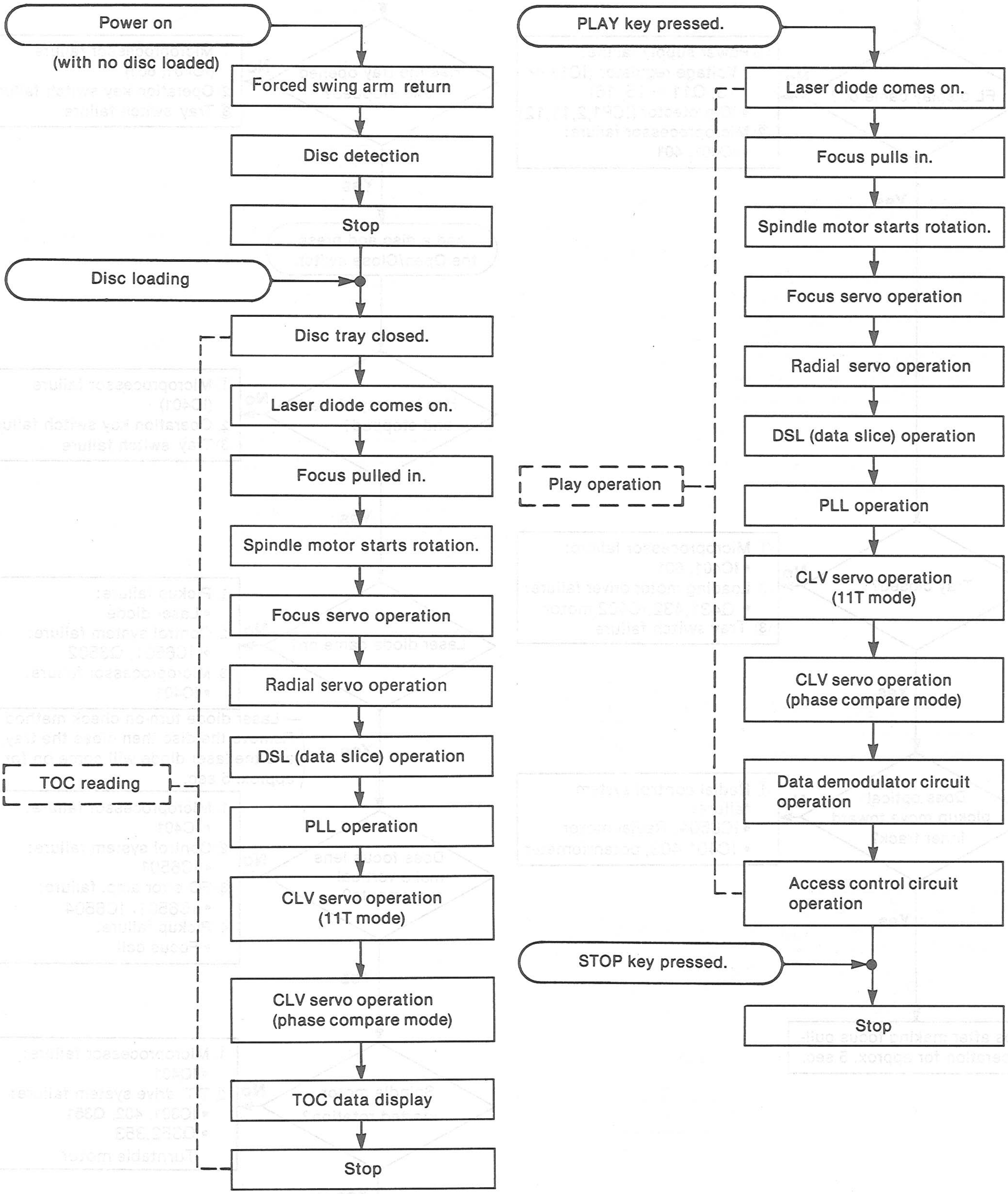


D

■ TROUBLESHOOTING GUIDE

SL-PJ46A Operation Sequence Check Sheet

Play Operation Sequence


Power on
(with no disc loaded)
Forced swing arm return
Disc detection
Stop
Disc loading
Disc tray closed.
Laser diode comes on.
Focus pulled in.
Spindle motor starts rotation.
Focus servo operation
Radial servo operation
DSL (data slice) operation
TOC reading
PLL operation
CLV servo operation (11T mode)
CLV servo operation (phase compare mode)
TOC data display
Stop
PLAY key pressed.
Laser diode comes on.
Focus pulls in.
Spindle motor starts rotation.
Focus servo operation
Radial servo operation
DSL (data slice) operation
Play operation
PLL operation
CLV servo operation (11T mode)
CLV servo operation (phase compare mode)
Data demodulator circuit operation
Access control circuit operation
STOP key pressed.
Stop